ELECTRICAL REVIEW

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Public Service

Principles and Practice for National Boards

WITH the nationalization of the electricity supply industry so near to hand it is profitable to examine an address given to the Institute of Public Administration by Sir Arthur Street, deputy-chairman of the National Coal Board, to discover how a new board sets about its work, how it chooses its men, and what principles guide its operation.

The first fear expressed in discussions on national boards is that they will adopt "Civil Service methods." Civil servants are more exposed to the public gaze than those in "private" employment and their shortcomings (although common to both) receive more attention than their merits. So it is (and will be) with the employees of public boards who will be forced to adopt Civil Service practice to a great degree. Sir Arthur Street (himself a former Civil Servant) showed the necessity and advantages of this practice and said that the boards' staffs would form a new "industrial Civil Service."

Qualifications of Staffs

These staffs would have to be good administrators, devoted to the public interest, impartial, guided by broad considerations of national policy, imaginative, capable of carrying responsibilities which were "crushing in comparison with those normally met with in the commercial world" and they must be capable of rapid and decisive action under conditions of external stress "such as the double pressures exerted on Government Departments by Parliament and the Cabinet." There are men in the electricity supply industry who have shown themselves able to meet such demands—even the last, in a smaller way, in municipal service.

In a reference to incentives, the speaker considered that payment by results should be introduced whenever possible—not an easy matter in the supply industry. He also urged the creation by the boards of a spirit of public service. This could be achieved only by the establishment of human relationships; by preventing the senior officials from becoming a new industrial ruling caste. Members of the management would have greater security of tenure but no hope of receiving very large salaries. Their incentive would be promotion according to merit to positions giving the prestige and satisfaction which (Sir Arthur said) only public service could offer.

Avoiding Detrimental Controls

In the speaker's view, public boards were subject to powerful influences to check inefficiency which did not operate in private concerns—publicity was one and control by the Ministers and Parliament another. Sir Arthur tentatively examined means by which Ministerial and Parliamentary control would not be exercised detrimentally. Upon this very cogent point he came to no definite conclusion: one suggestion was that there should be an independent official of the nature of the Comptroller and Auditor-General to examine the affairs of public boards and report to a committee of Parliament.

In the matter of relationships with the consumers, the idea of consumers' councils

was welcomed as a useful means of conveying views to the managements. As regarded prices Sir Arthur Street showed that the real conflict of interest was between the workers of the industry, the primary producers, and other workers in their capacity of consumers. The boards would have to hold the scales evenly between the contending parties.

In a reference to the dealings of the boards with private traders and the extended powers included in the boards' statutes the speaker expressed the view that when Parliament decided that a particular industry should come under public ownership, presumably it did not intend that, at the same time, other industries should be nationalized by the back-door merely through an extension of the activities of the board into adjoining fields. We trust that the British Electricity Authority will endorse this view.

Peak-Cutting

ALL the Regional Boards for Industry are actively pursuing plans for reducing the peak demand for electricity during next winter and it is evident that industrialists are loyally co-operating in what must be to them a heartbreaking business. Probably the most drastic proposal is that made in the Eastern Region where it has been suggested that firms shall shut down entirely for one day in five according to a rota arrangement. A clean cut of this sort is perhaps the easiest way out but the effect on production will be serious unless a good deal of overtime is worked on the other days. The plan has apparently been prompted largely by an antipathy to night-work but in other Regions a certain amount of this seems to be accepted as inevitable.

Union Representation

WE note that at a recent meeting of the National Executive Council of the Electrical Power Engineers' Association there was considerable criticism of the absence of representation of technical staffs on the Organizing Committee for the electricity supply industry. But as we pointed out in our leading article of May 23rd, a committee upon which every "sub-section" of the industry was represented would be unwieldy and unworkable. Technical representation is certainly not lacking and Mr. E. W. Bussey of the E.T.U. may be regarded as representing the employees generally (without class distinction). There are several unions which might lay claim to seats on the Committee (and the new authorities)—apart from other sectional interests. Such overweighting would tend to make the Central Authority and Area Boards concern themselves too much with wages and conditions, to the detriment of their main business—the generation and distribution of electricity. The public and the employees themselves will be better served if these matters are left to joint boards or councils set up especially to deal with them.

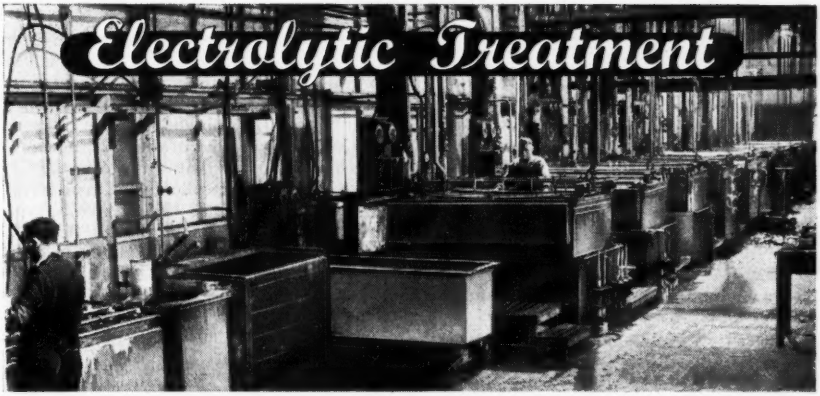
Severn Barrage

THE projected construction of a suspension bridge across the River Severn will not affect the use of the Bore to generate electricity. Although the Severn Barrage Report of 1933 provided for the incorporation in the scheme of road and railway crossings, the Committee of 1945 considered that these should be treated independently of power production, since they would tend to be mutually restrictive while offering little prospect of economy. Moreover it was anticipated that an independent bridge could be built in less than half the time taken to build the barrage, which was estimated in the later report at 8½ years. Particulars of the time allowed for bridge construction under the present proposals are not yet available.

Work Harder

ALTHOUGH this issue of the *Electrical Review* has to go to press before we have had a full report of the economic debate in the Commons, we may be sure that the suggested remedies for our difficulties included those enunciated by Sir Harry Railing at the annual meeting of the General Electric Co. last week. It is not disrespectful to Sir Harry to say that most of these remedies are obvious ones for we feel that reiteration by leaders of industry is very necessary. Briefly, we are called upon to work harder, to increase output per man—workmen, staffs and managements. But production must be facilitated by a reasonable attitude toward industry on the part of the Government and, particularly, the manufacture of articles requiring special skill must not be sacrificed in the urge to produce "utility" goods.

Electrolytic Treatment



THE following article deals with the various electro-plating and allied processes applied to aero-engine components which we recently saw carried out in the electrolytic treatment department at the factory of Rolls-Royce, Ltd., at Hillington. All high-speed engines are water-cooled, and nickel is the only metal, providing it is free from any porosity, which will stand up to the effects of such coolants as "Glycol." We are therefore introduced at this stage to a conveyor plant which is primarily concerned with the precision nickel plating of cylinder liners. The conveyor system ensures an even distribution of the deposit which must be at the minimum thickness of 4 "thous."

Electro-plating and allied processes at the Hillington factory of Rolls-Royce, Ltd.

The liners are first treated in an I.C.I. trichlorethylene degreaser, but this treatment is not sufficiently cleansing to permit the liners to be placed direct into the plating solution. They are therefore further cleaned electrolytically, both positively and negatively, in a caustic solution which gives absolute assurance that there is no trace of any organic matter left. The liners are then doubly swilled in running cold water and subsequently etched in a 10 per cent solution of sulphuric acid, using the liners as the anodes. This affords a heavy attack on the base metal, owing to the weak state of the solution. The liners are next placed in a 50 per cent solution of sulphuric acid in which they are again used as anodes, and this removes any signs of carbon and leaves the liners in a matt grey fine-etched condition. Further swilling in two running waters, to make sure there are no signs of sulphuric acid left, renders the liners chemically clean and ready for plating.

For treatment in the plating vat each liner is mounted on a jig with an internal holding connection, so that the outside surface is free from any interference with or obstruction to the nickel deposition. The plating time is about 5½ hours. The vat accommodates 62 liners which are suspended on the conveyor. This is driven by a 3-h.p. motor, and a wide-speed-reduction transmission system gives a conveyor speed of one complete conveyor journey in 25 min. The vat is about 22 ft long and 3 ft wide. While each liner is travelling with the conveyor it is also rotating independently on its own axis. This independent rotation is effected by a fixed chain along the line of the conveyor, which is engaged by a gear-wheel on the jig hanger. Supplies to the submerged jigs are taken from busbars above the conveyor line by means of sliding-brush pick-ups.

There are four nickel-plating conveyor vats like this one, two of which are supplied from 2,000-A, 10-V d.c. generators driven by 37·5-h.p. a.c. motors, while the other two vats are supplied from 2,000-A, 10-V copper-oxide, oil-immersed, water-cooled rectifiers which are, in turn, supplied through transformers from reactors. These rectifiers are aligned with others for other processes in an annexe to the main plating room.

Preparation of the work for chromium plating is very similar to that already described for nickel plating. A line of five still

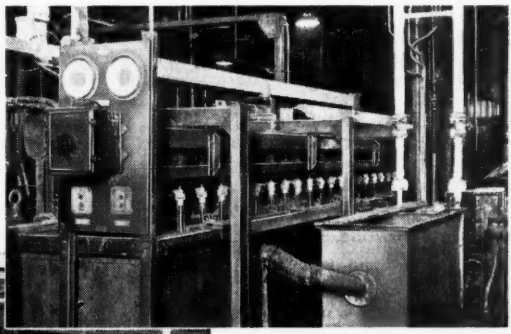
chromium-plating vats is used for treatment of the interior surfaces of cylinder liners to a depth of 7 thous over an area of 2 in. from the top of the liner (see title illustration). This treatment has been proved to give the liner a much greater life, owing to the hardness of the chromium deposit which eliminates to a very great extent the wear and tear resulting from piston slap at about ¾ in. from the top of the liner. The liners are mounted in jigs which are suspended on work bars at the tops of the vats. Two 3,000-A, 10-V generators supply two vats, while the other three vats are supplied collectively from one 5,000-A motor-generator set.

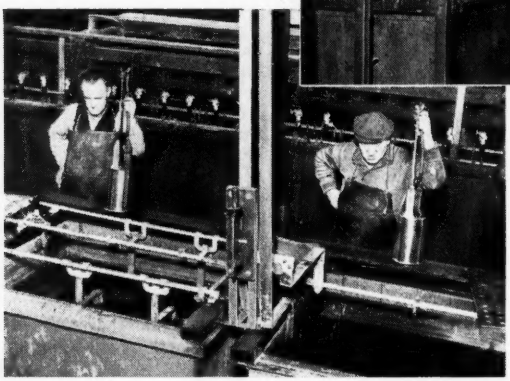
So as to adjust the amperage on the three vats according to the charges in the various vats, there is in each vat supply circuit a variable-load regulating resistance. The plating time is 24 hours for a thickness of up to 24 thous on the treated part of the work. These chromium-plating vats are also used for other components which are subjected to hard wear, as well as for salvaged parts such as ball-race housings, while many components which have been machined slightly below the machining limits can be economically saved by this process.

For the purpose of chromium plating valve rockers, in which uniform deposition is necessary not only over the treated surface of each rocker, but throughout all the rockers in a batch under treatment, "Rotomatic" (conveyor type) vats are used. Up to 360 rockers at a time can be accommodated in each vat. The rockers are placed in jigs—10 on each jig—and the jigs are suspended from the conveyor in a similar manner to that described in connection with automatic nickel plating. The rate of deposition in these vats is 0·00075 in. per hour. The only difference in the conveyor system from that of the "Rotomatic" nickel-plating vats is that in this case the jigs do not revolve independently of their travel on the conveyor system. Two conveyor-type chromium-plating vats are each supplied from a motor-generator set at 1,500 A, 10 V. Each vat has its own fume-extracting plant which incorporates a motor-driven exhaust fan.

Cadmium plating is treatment which is mainly given to such components as clutch gears, thrust outings, nuts, etc., of sea-going craft, as protection against corrosion brought about by salt-laden atmospheres. The preparation is similar to that described for nickel and chromium plating. The articles under treatment are suspended in the solution from work bars by copper wire and the cadmium-plating vat measures about 6 ft long, 4 ft wide and 3 ft deep. The vat is arranged in a line with two similar vats which are devoted to copper and tin plating, respectively, and all three of these vats are supplied from a 1,000-A, 10-V m.g. set.

Copper is deposited as a protection for carburized parts such as gears where the teeth only must remain hard; therefore every

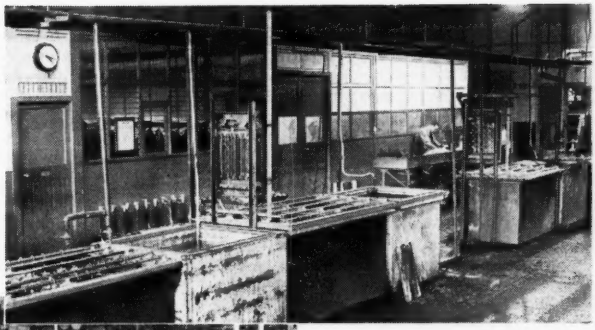




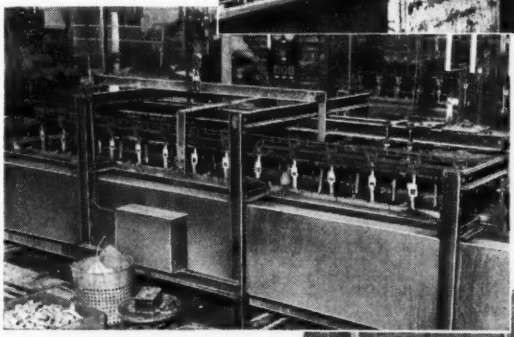
Above: This conveyor vat is primarily concerned with the precision nickel plating of cylinder liners (end view)

Left: Before plating, the components are subjected to exhaustive cleaning in the tanks in foreground

part of the component except the teeth is coppered. With a good deposit of copper there can be no such thing as carbon penetration. This deposition takes place before carburizing. Tin plating is employed mainly where a deposited bed is required for subsequent brazing work.

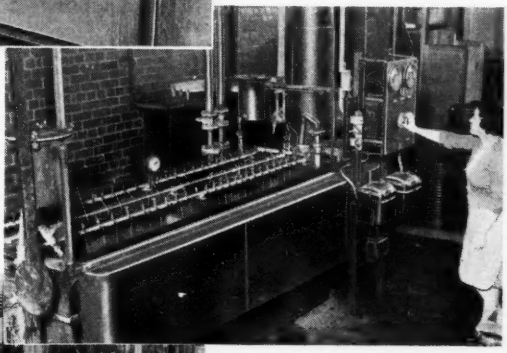


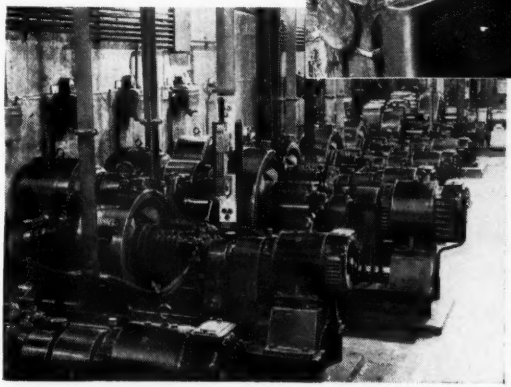
The aligned cadmium-, copper- and tin-plating vats are all similar



Treatment of valve rockers in "Rotomatic" chromium plant ensures uniform deposition

Chromic-acid anodizing is a process the major contribution of which is to the detection of cracks. If an aluminium forging is machined, polished and anodized, it is possible to detect immediately on its removal from the anodizing vat and subsequent swilling and drying, any cracks or porosity which are indicated by the brown stains of the chromic acid which has penetrated into the affected parts. A good secondary point about chromic-acid anodizing is the tendency of the acid to oxidize the metal and, in consequence, leave a hard oxide skin on the face of the metal.



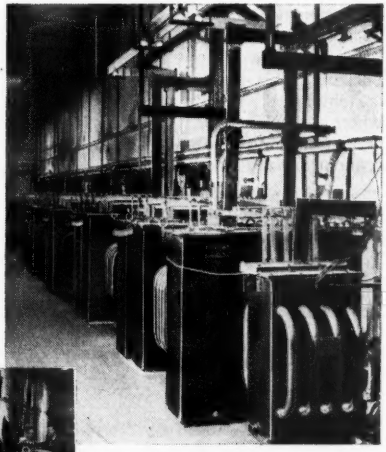


Above: The major advantage of chromic-acid anodizing lies in its contribution to crack detection
Left: The bulk of the m.g. sets are housed in one of the annexes to the plating room

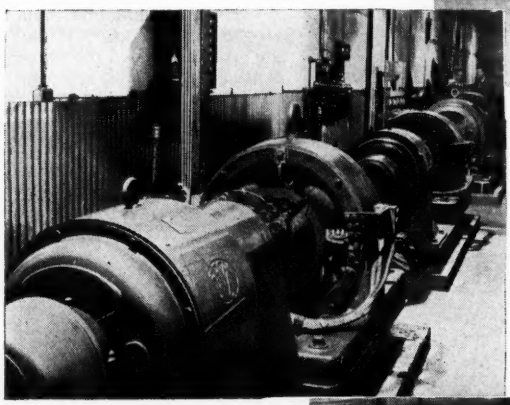
In the electrolytic circuit the work is arranged as the anode,

while stainless-steel is employed for the cathode. The plating process is carried out at a temperature of 50 deg C. When this temperature is attained the electrolytic circuit is closed and 10 V is initially applied. This voltage is increased progressively in 2-V steps at one-minute intervals up to a maximum of 40 V. At this voltage the "charging" is kept constant for 30 min, after which time the voltage is further increased in 2-V steps at one-minute intervals up to a maximum of 50 V. Continuation of the "charge" at this maximum voltage for 15 min renders the process complete. A still vat is employed for this process and it is supplied from a 500-A, 60-V m.g. set. Similar methods of suspension and supply are employed to those which are used for the still vats in connection with other processes.

Sulphuric-acid anodizing provides a perfectly clean surface on the treated work, thus facilitating the adherence of any solution which may be applied to the work. The process is therefore employed for castings which are to be doped (covered) subsequently with aluminium resin paint or, say, synthetic-resin material. The electrolytic principle in this case is the same as that for chromic-acid anodizing, but instead of stainless-steel cathodes, lead cathodes are used. The sulphuric-acid anodizing still vat is supplied from a 1,750-A, 12-V m.g. set. The comprehensive electrolytic treatment installation described was supplied in the main by W. Canning & Co., Ltd.

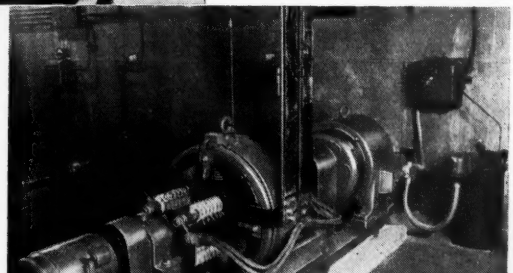


These rectifiers serve four still chromium vats, and two conveyor-type nickel vats



Above: These three m.g. sets supply the five still chromium-plating vats

Right: Each m.g. set is a three-unit equipment, including the separate exciter



We are indebted to Rolls-Royce, Ltd., for permission to visit the department and to publish this article; and to Mr. William Douglas, electrical engineer, and Mr. W. Trelfa, superintendent, Plating Department, for their help in obtaining information and photographs.

Views on the News

Reflections on Current Topics

THE consignment of coal to Newcastle was once considered to be the height of absurdity. Now, in this mad world, nothing is thought of the importation of coal from the United States; we are to receive about 396,000 tons this month. We have plenty of coal here but are short of dollars and so it is obviously the right thing to employ valuable shipping to cart coal across the Atlantic.

* * *

At Carlisle complaints are being made by local fishermen that the condenser cooling water from the power station is raising the temperature of the River Eden to such an extent as to endanger the life of the salmon there. In the neighbourhood of the station water temperatures of between 63 and 76 deg F were recorded and it is anticipated that when the extensions to the station are in operation the position will be much worse. It is intended by the Eden Fishery Board to place the matter before the Electricity Commissioners with a view to securing safeguards. The chairman suggested that they should " press for cooling towers." I suggest the introduction of a few tropical fish as an experiment.

* * *

It is some little time since I last saw a reference to Woodhouse & Rawson, those pioneers of public electricity supply in this country and overseas. Their name crops up in an account of the jubilee of the Durban (Natal) undertaking which appears in the *South African Electrical Review* (no connection with this journal). They were operators of the Town Hall plant which preceded the public supply. That supply was initiated by the borough engineer whose scheme was endorsed by Mr. W. H. Preece who was called in for an opinion. The original plant was made by the Electric Construction Co., Ltd., who sent with it a young Scots engineer named John Roberts. When the installation was completed in 1898 Roberts was offered, and accepted, the new post of borough electrical engineer, and held it for thirty-four years when he retired. He died in 1937. Mr. Roberts was succeeded by Mr. J. H. Gyles, who retired in 1939 and was followed by the present engineer, Mr. C. Kinsman. Mr. Kinsman is the present president of the Association of Municipal Undertakings of South Africa and Rhodesia.

* * *

The determination of the South Australian authorities to go ahead with the development of the Leigh Creek Coalfield is shown in a series of advertisements in an electrical journal which has just come to hand though published in April. These called for an engineer for coal production, a field manager, a civil engineer, a mechanical engineer and a chief clerk. Applications had to be in by May 31st. The sponsors of the scheme are the Electricity Trust of South Australia which recently took over the Adelaide Electric Supply Company's business. Considerable doubt had been expressed by the company in the past regarding the suitability of Leigh Creek coal for firing power-station boilers but evidently the new Trust is prepared to back its opinion that the proposal is an economic one.

* * *

In view of the present inability of natural resources in most countries to meet the demand for power, a tendency to barter power for other products, where practicable, is to be expected. Thus Dr. A. Meyer recently referred to the transmission from Sweden to Denmark of electricity generated in water-power stations. This power has been supplemented by thermal energy from British coal paid for in agricultural products. It is also reported that hydro-electricity is sent from Norway to Denmark (*via* Sweden) in return for oil needed for process work, which is presumably obtained by Denmark by similar methods of exchange.

* * *

Recently I drew attention to the queerly-named " Fuel Economy Festival " organized by the Electrical Association for Women; now I hear of a further example of " kissing the rod." This is at Littleborough, near Rochdale, where, according to the chairman of the Electricity Committee, it has been suggested that an endeavour should be made to " create enthusiasm " to reduce the consumption of electricity. This would be the sort of enthusiasm with which one approaches the dentist.—**REFLECTOR.**

NEW BOOKS

Cost Accountancy. Engineering Calculations.

Practical Book-keeping and Costing. By F. A. Gordon, M.Com., and W. Wade, A.S.A.A., etc. In three parts: Part I (222 pp.), 6s. 6d.; Part II (162 pp.), 6s. 6d.; Part III (226 pp.), 7s. 6d. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, Kingsway, W.C.2.

This three-volume work is described as an introduction for commercial and technical students although the latter will find the addition to their purely technical studies something of a load. Nevertheless, the subject of cost accounting is one with which they should be acquainted and for this purpose Part III should prove of value. The treatment here appears to be comprehensive and deep enough for the student; it covers a great many aspects in reasonably short space and in an easily understood style, occasionally rather too simple perhaps.

It is considered by the authors that a study of Part I (General Accounting) is a necessary prelude to tackling Part III. Part II, which is an extension of the first volume, may possibly be " skipped " by the technical man.—J.H.C.

Workshop Engineering Calculations and Technical Science. Vol. I. By J. Stoney. Pp. 196; figs. 151; index. The English Universities Press, Ltd., Warwick Square, London, E.C.4. Price 10s. 6d.

In the new Education Act provision has been made for all forms of technical education and, in addition, the majority of apprentices in engineering establishments are encouraged not only to attend evening classes at the local technical college but to spend at least one day per week in the classroom. The result is of necessity a considerable increase in the teaching of the more elementary stages of technical science and mathematics. This, in turn, demands the production of textbooks written specially to satisfy the requirements of students who have not had the benefit of anything more than the normal elementary school education and, moreover, the books must be so written that they arouse the interest of the student right from the outset by relating the subject under consideration to actual everyday technical problems.

The book under review has been written to cover the first year course for engineering students and deals specifically with three subjects, viz., elementary mathematics, mechanics and that branch of physics which is usually termed heat. The first includes, in addition to such useful arithmetical processes as averages, squares and square roots, some simple algebra and trigonometry and the author is to be congratulated on the manner in which he directs each chapter towards simple engineering problems. The same care has been taken in the chapters on mechanics and heat, the essential usefulness of these subjects being at once made apparent to the young engineer. A large number of practical numerical examples (with answers) are included after each chapter. In view, however, of the importance of electricity in all branches of engineering and technical science, the fundamentals of electrical engineering should certainly be included in first year technical science and it is to be regretted that space could not be found for a chapter or two on electricity along the same lines as those on heat.

With that reservation, this is a really excellent text-book which should not only meet the requirements of young students, but may even be recommended to the teachers in whose care they will be placed.—A.R.

" Electrical Engineer " Reference Book. Edited by E. Molloy, 1,757 pages; illus. George Newnes, Ltd., Tower House, Southampton Street, London, W.C 2. Price £2 2s.

This is the second edition of a work which was favourably noticed in our issue of July 13th, 1945. The most notable alteration is an extension of the first section of the thirty-two sections of the work. New matter bringing the number of pages in the section from 102 up to 142 includes symmetrical components, transients, loci of complex functions and mathematical tables. The section entitled " Progress " has also been amplified and a number of additions have been made to the list of notable electrical books and Press articles.—C.O.B.

Men and Volts at War. By John Anderson Miller. Pp. 272; illus. McGraw-Hill Publishing Co., Ltd., Aldwych House, London, W.C.2. Price 19s.

This is the story of the General Electric Company of America in " World War II." As was the case with our own great electrical concerns, the American G.E. made important contributions of an amazing variety towards the defeat of our common enemies and the story is well told, with many good illustrations, although the book might have had a better title.

Books Received

Dynamic Motion and Time Study. By James J. Gillespie. Pp. 95; figs. 11; illus. and index. Paul Elek, Publishers, Ltd., 37-38, Hatton Garden, London, E.C.1. Price 7s. 6d.

Metal Working and Heat Treatment Manual. (Vol. 2). By F. Johnson. Pp. 226; figs. 74; index. Paul Elek Publishers, Ltd. Price 17s. 6d.

Electricity and Fire Risk. By E. S. Hodges. Pp. 285; index. Sir Isaac Pitman & Sons. Price 15s.

Factory Canteens

Suggestions for Planning and Improvement

By H. M. Harman

WARTIME regulations, which are still in force, require that where a factory employs more than 250 operatives, feeding arrangements must be provided. Many factory managements look upon the canteen as a necessary evil, but others appreciate that good food and clean accommodation promote healthy, happy workers, and although below the 250 limit make the necessary provisions. The old style canteen with its wooden tables, wooden forms and cabbage smell is rapidly passing out of existence. To-day many canteens are equipped with tubular steel chairs, plastic-topped tables, stainless steel cafeterias and modern kitchen equipment, and above all good food is provided.

Before discussing layouts and equipment a word should be said about organization. The first consideration when deciding the size of a canteen will be the number of main meals to be served. This will depend upon several factors. First the number of employees must be considered, then the proximity of the workers' homes, the availability of cafés and restaurants and the number of public houses near the works. For example a factory employing a thousand workers, which is situated two or three miles from a town and is not near any shops or cafés will require a canteen capable of feeding about 75 per cent of its employees. On the other hand a works with, say, a staff of three hundred which is right in a town will probably only require accommodation for about 25 per cent of its workers.

The next most important item is how many shifts it is proposed to spread the mid-day meal over. In America some of the large industrial concerns spread their lunch break over, say, two hours. They do not stop half the factory at noon and the other half at 1 p.m. They let the workers break off in groups of about 15 per cent of the total employees. The first group may leave their machines at noon while the next group leave ten minutes after and so on until employees in all the shops have had their break.

This scheme has a considerable advantage over the conventional method of arranging lunch breaks. The men can stroll into the canteen, pass through the servery rails, select their food and eat it without the usual rushing and scrambling. The canteen is large enough to provide meals for say 1,000 workers but at no time are there more than about one hundred and fifty to be served. All this is a great help to both diners and staff.

By this method canteen accommodation can be cut by half, for there is never more than half the staff in at any one time.

When estimating the size of the canteen a good plan is to allow about 10 sq ft of dining room space per worker and about 4 sq ft of space per dinner for the kitchen. If the shift scheme is adopted the dining room space can be halved but of course the kitchen allowance must stand because even though the diners spread their meal break over a longer period the kitchen staff have to prepare all the food in approximately the same time.

Having arrived at a total area for the dining rooms and kitchen the next thing to do is to prepare a layout taking advantage of

every available inch of space. In the kitchen separate preparation rooms should be allowed for vegetables, fish and meat and there should be an ample grocery store. The cooking equipment should be laid out in such a manner that all unnecessary steps are avoided. For example the fish fryer should be just outside the fish preparation room and the roasting ovens outside the meat preparation room. The staff will appreciate this consideration, for a busy cook will walk quite a number of miles during the day.

In the dining rooms there is plenty of scope for breaking the monotony. For instance two sizes of tables can be used, one being square and seating four people, the other rectangular and seating six people. By varying the layout of the tables an effective change of scene can be provided.

Multi-entry servery rails are better than the long queue type. With the former a diner queues for one course only and then carries it to the tables, but with the other type, which seems to be favoured in most public cafeterias the diner proceeds slowly along an aisle between the counter and the barrier rail. On the way he collects all his courses on a tray and then works his way to his table. This method is very slow as the diner who cannot make up his mind what he wants holds up everybody. With the other scheme he can only get one dish at each queue therefore he must make up his mind what he wants to eat before he approaches the counter.

In the dining room an endeavour should be made to create an intimate atmosphere. A low ceiling is more homely than a high one and if adequate ventilation is provided it can be just as healthy. Plenty of windows with plenty of clear glass should be the aim. They should come right down to the floor and it should be possible to open them all. Then in the summer the room will never become overheated.

Around the walls that are not occupied l y windows, painted scenes or other decoration can relieve the monotony. If this is thought too ambitious, it may be possible to use pictorial posters with excellent effect. One canteen seen by the writer had hundreds of framed caricatures of the workers all done by employees hung around the walls, another had cartoons measuring about 8 ft. by 4 ft. displayed. Each cartoon had a snappy verse beneath and there were sufficient in stock to provide a periodical change round. Outside the canteen lawns and seats should be provided for the use of the workers during the summer.

The provision of canteen accommodation can be a fascinating business. A study of it will prove beneficial to any management because it plays a very big part in industrial psychology. The title illustration shows the men's dining hall at the Coventry works of the General Electric Co., Ltd.

Public Lighting Conference

THE annual conference of the Association of Public Lighting Engineers will be held at Southport from September 15th to 19th. It will be held at the Cambridge Hall, and during the meeting a demonstration of equipment is being organized in roads nearby.

The arrangements for the first day are the Council meeting, annual general meeting, official opening by the Mayor, induction of the new president and a reception by the Mayor. The second day's proceedings will open with the presidential address by Mr. T. Wilkie (lighting engineer, Leicester), which will be followed by a paper on " Street Lighting in Relation to Road Safety, Traffic Problems and Crime Detection," by Mr. A. E. Marchant (Barking) and Mr. R. Bell (Erith), and " Maintenance of Street Lighting " by Mr. J. Woodhouse (Lighting Department, Sheffield).

On the third day Dr. S. English will present a paper on " Photometry in Relation to Public Lighting." This will be followed by the conference luncheon, after which manufacturers will explain details of street lighting installations specially erected for the conference. An official inspection of these installations will take place in the evening. The papers to be presented on the fourth day are " Lighting of Class ' B ' Side and Residential Roads," by Mr. R. W. Steel (Cheltenham) and " The Royal Fine Art Commission and Lamp Columns," by Mr. A. B. Knapp-Fisher. In the evening there will be a reception by the President followed by a dance and entertainment. The final day will be devoted to a coach tour via Liverpool, which will include inspection of the Mersey Tunnel lighting.

I.E.E. North-Western Students

The annual summer visit of the North-Western Students' Section of the I.E.E., on August 24th, will be to Chester Corporation's hydro-electric station, followed by a motor coach tour via Llangollen and the Horseshoe Pass to Rhyl, and thence back to Manchester.

Swiss Farming

Use of Electrical Methods

By Felix Wirth

DEVELOPMENTS in Swiss agriculture have been substantially stimulated by wartime conditions, which have led to a very extensive use of electrically operated machinery in order to secure the highest possible level of food production. Electrically produced heat has gained considerable ground in pig breeding, particularly in the preparation of pig-food. The steamer is switched on at night only, and so adjusted that the food is ready for consumption in ten hours; no supervision is required. The preparation of 210 to 350 pints of food requires 20 to 30 kWh per night at low rates. The infra-red lamp enables young pigs (for which warmth is essential) to be reared practically without loss and aids fattening, since it substantially reduces the time required to obtain an optimum weight owing to more economical use of the food.

Remunerative poultry farming is now regarded as dependent upon electricity, not only in incubation but also in all subsequent stages of the birds' life, particularly when the young hens have reached the laying age. For instance it has proved advantageous to heat the perches. As a result of such methods an improvement of 5 per cent has been achieved in laying capacity. The hen, being a bird of tropical origin, requires twelve hours of daylight, but in the temperate zone the days are too short in winter. Hens subject to artificial lighting conditions have been found to lay 30 per cent more eggs in the winter (when better prices are obtainable) than those not so treated. The intensity of the illumination is of no importance: it is merely a question of an apparent prolongation of daytime which impels the hen to keep moving, to feed and consequently to lay more eggs.

In the Dairy

Large quantities of milk have been saved as a result of using properly cleansed containers through the use of water heaters in the dairy. Experiments in Switzerland extending over many years have produced gratifying results when drinking water for cattle has had the chill taken off by means of a water-heater, especially in highland districts where the water is obtained directly from springs. As a result of raising temperature to between 54 and 57 deg F, the daily yield of milk per head of cattle has been increased by about 2¼ pints. The explanation is that during the dry-fodder period (i.e., in winter) a cow consumes about 105 pints of water a day. Taking the chill off the water prevents an excessive extraction of heat from the animal's reserves; this eliminates chills and promotes normal functioning of the digestive organs.

Sterilized Fruit Juices

The preparation of sterilized cider or perry (suessmost) is of much more recent origin than the drying of fruit by means of electricity. Initially the liquid was prepared almost exclusively by chemical means but it can now be prepared by the use of the electrode process. The plant is inexpensive and clean and simple to operate. From 440 to 530 pints of suessmost can be sterilized in eight hours for a consumption of 9 kWh per 100 litres.

It is not always feasible in Switzerland to get the first and the second hay crops in under favourable weather conditions. Hay which has been exposed to bad weather readily becomes mouldy, quite apart from the earthy impurities it contains. Hay that has fermented possesses a consistency quite different from that which it possessed before fermentation. It is matted together and a certain quantity has to be cut up daily with a knife for winter feeding, thoroughly shaken out and loosened. To prepare the hay for twenty cows occupies the time of two men every day for an hour to an hour and a half, whereas the hay dresser, which both loosens the hay and removes dust, does the work in ten to fifteen minutes.

Switzerland has, in the past, lost the equivalent of 100 million francs annually through reliance on the traditional method of drying first and second hay crops by spreading on the ground in the sun, resulting even in the most favourable circumstances in the loss of 40 per cent in starch units. In bad weather losses exceeding 60 per cent may be caused by drenching, mechanical losses, exhalation of the carbohydrates and decomposition of the proteins. Even when the hay has been brought in under relatively favourable conditions, further losses in the

stack are caused by fermentation. Overheating of the stacks often leads to considerable depreciation of the nutritive value of the hay.

Artificial methods now make the drying of hay independent of the weather. As the fodder is brought in whilst still green, mechanical losses are also minimized. Finally, drying by machine takes only 15 minutes, so that losses by exhalation and by decomposition of the proteins need not be feared. In this manner the Swiss obtain fodder of inherently higher value than would otherwise be possible.

Artificially dried grass and valuable clover hay and also dried herbs, grain and potatoes are ground to a powder in mills, which makes them more easily assimilable by farm animals. Fully automatic electric ventilation of stables and sheds functioning for 5 to 10 minutes in every hour enables the air to be replaced three times. This system works reliably and costs very little to run. The electric milker is the most intensively worked machine in farming, since it is used at least twice daily, but its consumption is only some 100 kWh per year for twenty cows. In addition to its merit of ensuring clean and germ-free milk, its labour-saving properties should be emphasized. The milk cooler is indispensable where suitable cooling provisions are otherwise absent and where priority milk is produced. The milk is brought down to about 38 deg F immediately after the milking.

Radio Research

I.E.E. Survey and Recommendations

THE publication was authorized last week of a report entitled "British Research in the Radio Field," which has been prepared by the permanent Research Committee of the Institution of Electrical Engineers, from which copies are obtainable for 1s. each.

This kind of research is first classified into five categories; the universities, Government establishments and industrial organizations which conduct such work are next named in order of capacity and present facilities. The report then proceeds to a critical assessment of existing potentialities, paying some attention to the adjacent field of electro-physics, which is often the origin of developments in radio science.

The report urges the stimulation of radio research, the need for which was consistently supported in the evidence given, in order to provide a steady flow of fresh ideas and discoveries, which are an essential "raw material" of a flourishing radio industry, to render it capable of holding its own in world-wide competition.

Team Leaders' Qualifications

It was reiterated again and again in the evidence heard that successful radio research is more dependent on the qualities, character and inspiration of the research team leaders than on any other factor governing its conduct. The vital necessity is therefore to discover leaders and provide sufficient workers trained in the research outlook, who should be of a calibre adequate not only to tackle problems as they arise, but also to assess the impact of discoveries on existing methods and procedure.

The means most likely immediately to achieve this aim is for the universities to carry out well-directed programmes of research which, in addition to training graduates and fitting them to undertake effective research on their own account after they leave the Universities, also stand a very good chance of leading to valuable discoveries in themselves. Another favoured method is the training, by industry, of research workers chosen for their special aptitudes for work of this kind from their own technical staffs.

Factors which at present limit radio research have been examined and, to overcome them, the report makes thirteen detailed recommendations. These are concerned with the provision of more adequate finance, long-term planning of industrial research, the erection of buildings therefor (which necessity is even more pressing than the need for more workers) concurrently with national rehousing, ensuring the continuity of research in universities, the staffing of laboratories, scale and uniformity of emolument and pensions, interchange of academic and industrial research workers and additional post-graduate radio scholarships.

Further recommendations are made for more effectively co-ordinating radio research, although the special character of this work makes vigorous or repressive efforts at co-ordination undesirable.

Early availability of the results of research is of vital importance and the report recommends the establishment of an agency bureau to disseminate details and afford an intelligence service, which would tend to help co-ordination and avoid the overlapping of effort.

Buyers' and Representatives' Association

AT a meeting held in London on June 17th it was decided to inaugurate the Engineer Buyers' and Representatives' Association to link buyers in an association with representatives of manufacturers and traders. Mr. A. J. Dronsfield was elected hon. organizing secretary and the address of the Association will for the present be at 47, Victoria Street, S.W.1.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Wasted Man-Power ?

MAY I, through the medium of your journal, ask for answers to questions which puzzle me a great deal ? First: Why is a man too old at 47 to obtain a position of responsibility ? Secondly: Why is it so necessary for a man to have degrees ?

I ask these questions because of the experience of my husband, who is a thoroughly capable supervising engineer conversant with all branches of electricity, able to control men, to design and prepare drawings, and to estimate. At present, through lighting restrictions (he is doing neon), his position is precarious, so naturally he has written for dozens of jobs advertised in the *Electrical Review* which he would be perfectly capable of doing, yet he receives no replies.

I cannot understand why interviews are not granted; one cannot draw conclusions from letters and in times like these, to me it seems perfectly ridiculous that such good man-power should be wasted. Maybe you will think that a wife is naturally prejudiced in favour of her husband. In this case it is not so; my husband is definitely a good man at his trade and there is not a thing which he will let beat him.

I shall greatly appreciate it if my name is not published, as my husband is ignorant of the fact that I am writing to you.

SUPERVISOR'S WIFE.

Ohm's Law

I SHOULD like to congratulate Mr. Thomas Carter on his article on " Ohm's Law " in the *Electrical Review* of August 1st. Mr. Carter in his article and by his researches has established a meaning of the Law as laid down by Dr. Ohm and his findings are in agreement with my own views. There appeared in the September issue of the *I.E.E. Journal* an article entitled " Silicon Carbide Non-ohmic Resistors," the term " non-ohmic " being used to describe " resistors characterized by a striking departure from Ohm's Law." I entered into a very protracted correspondence with the author, Dr. R. W. Sillars, in which I protested about the use of this term and in which I pointed out that no conductor departs from Ohm's Law and I am very pleased to find Mr. Carter substantiating my opinion. I now leave the floor to Mr. Carter and Dr. Sillars.

Walton-on-Thames. R. WELLS, A.M.I.E.E.

Electric Motor Prices

DURING recent months there has been some criticism of the prices which machinery traders have been quoting for reconditioned electric motors. The Association of Electric Machinery Traders took the lead in adopting a policy intended to keep such prices as low as present-day trading conditions permit and there is ample evidence that as a whole traders such as those represented in the membership of the A.E.M.T. have faithfully carried out the Association's recommendations. It must be realized that for a considerable time these traders have been frequently compelled by circumstances outside their control to pay more than the manufacturers' new prices in order to obtain machines which their clients required and the supply of which was part of the normal services provided by the trader.

This position has resulted in the apparently high profit on a particular transaction going into the pocket of the original vendor of the machine, *not* to the trader, and very frequently the vendor has been H.M. Government, so in the long run the nation has been the, doubtful or otherwise, beneficiary, according to one's particular economic views.

It is, of course, a fact that in such circumstances of short supply as now exist the purchaser largely controls the market price, and no better proof of this is needed than a public auction sale. During the last week in July a Ministry of Supply sale held for three days at a depot near Wolverhampton included a large quantity and variety of electric motors. The purchasers numbered to a marked extent many leading industrial concerns and some public undertakings as distinct from re-sellers. The following typical prices require no further comment beyond the statement that they are in every case more than double those which A.E.M.T. members have been quoting recently:—

1-h.p. geared motors, 192 r.p.m.,

£43-£56 each; 4-h.p. standard 4-pole squirrel-cage motor, £47 10s.; 25-h.p. standard 6-pole slip-ring motor, £240; 1-h.p. standard 8-pole s.c. motor, £25; 6-h.p. 6-pole s.c. motor, £50; 7½-h.p. standard 4-pole s.c. motor, £52; ½-h.p. geared motor, 20 r.p.m., £43; 2-h.p. geared motor, 33 r.p.m., £80; 2-h.p. geared motor, 320 r.p.m., £65; one 3-h.p. 8-pole and two 7½-h.p. 6-pole standard s.c. motors, £140 the lot. All the above were 400/440-V, three-phase, 50-cycle motors mostly screen protected. The majority appeared to require overhauling before being put into service.

*London, N.*1. W. E. LAWTON,
Chairman, A.E.M.T.

Paralleling Diesel Sets

WITH reference to the letter of "S.L." in your issue of July 11th and the subsequent correspondence in your issue of July 25th, the "lamps bright" method of synchronizing small Diesel alternators advocated by Mr. A. M. Jones, although sound in theory, will prove troublesome in practice if the synchronizing is to be carried out by inexperienced operators. The operator is required to judge the instant when lamps 2 and 3 are of equal brightness and he will be apt to close the switch when either lamp 2 or lamp 3 is at maximum brightness, i.e., when the incoming alternator will be 60 deg out of phase. Mr. K. W. O'Hara appreciates this difficulty when he states that a potential transformer of ratio 1 : 1 is necessary for the "lamps bright" method.

No difficulty should be encountered with the "lamps dark" method if the incoming alternator is made to run slightly faster than the bus-bar frequency and the switch is closed at an instant half way in the "lamps bright–lamps dark–lamps bright" cycle.

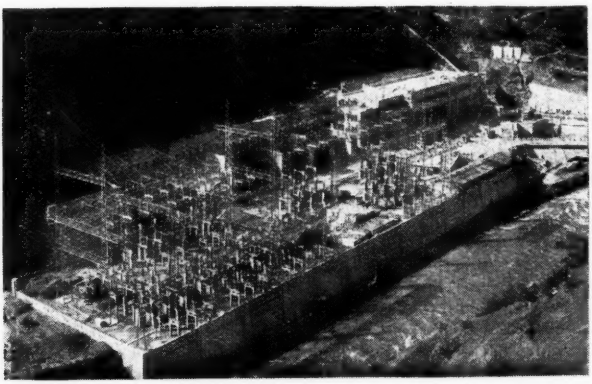
A simple means of checking phase rotation can be obtained by connecting lamps across the alternator switch from Red on bus-bar side to Yellow on alternator side and from Yellow on bus-bar side to Blue on alternator side. The alternator should then be run up to speed and its voltage adjusted as if for synchronizing. If the phase rotation of the alternator is correct, both sets of lamps will reach maximum brilliance simultaneously. If not, the two sets of lamps will reach it alternately.

Cleveleys, near Blackpool. W. JAMIESON, B.Sc., A.M.I.E.E.

French Water-Power Development

New 60,000-kW Station

THE recently completed hydro-electric station on the Cordeac falls of the River Drac has a capacity of 60,000 kW and an annual output of about 220 million kWh. Water is taken from the tail race of the older Sautet station, which has a similar output, by means of an underground gallery 2¾ miles long which starts at a dam 275 yd below Sautet and crosses the Drac by an aqueduct. The average annual flow from the Drac to the Sautet is at the rate of 480,000 gal. per min. and the Sautet reservoir holds 28,500 million gal. The Cordeac falls are 1,900 ft high with a maximum flow of 1,150,000 gal. per min. The new station contains a 40,000-kW 214-r.p.m. and a 20,000-kW 300-r.p.m. set; maximum efficiencies are 9·25 and 92 per cent. The larger set normally feeds into the La Boisse system, which is linked with the Paris high-voltage network, through a 10·5/220-kV transformer and the other into the Sautet-Cordeac Parisset 150-kV network. Interchange of power between the two takes place through a 150/220-kV transformer, with a 10·5-kV tertiary winding, which permits the two alternators to feed either transmission system.



Substation at the Cordeac plant

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT is announced that **Mr. Leslie Gamage,** vice-chairman and joint managing director of the General Electric Co., Ltd., has been appointed chief business adviser to Lord Nathan, Minister of Civil Aviation. Mr. Gamage is a past president of the Chartered Institute of Secretaries, has been president of the Institute of Export since 1943, and is chairman of the British Export Trade Research Organization. He is also a member of the Grand Council of the Federation of British Industries and the Council of Industrial Design.

Mr. A. H. M. Jacob, who as recently reported has been appointed an executive director of W. T. Henley's Telegraph Works Co., Ltd., has resigned the position of secretary, and **Mr. R. F. Gyngell,** assistant secretary of the company for a number of years, has been appointed secretary as from August 1st.

Mr. B. V. Holbrook, manager since 1937 of Brown Brothers, Ltd., Hull Branch, is relinquishing his position and will shortly operate in a sales supervisory capacity in the North of England for the company. **Mr. M. S. Inglis,** formerly assistant branch manager at Birmingham, has been appointed to succeed Mr. Holbrook at Hull. Mr. Inglis, before his move to Birmingham, was for some time with the company's branch at Manchester.

Mr. C. Milton Marshall, works manager of British Moulded Plastics, Ltd., has been elected to the board and appointed works director. **Mr. B. A. Ensell** has been appointed managing director of Moulded Products, Ltd. Messrs. **N. D. Newall** and **H. P. Bridge** have joined the board, and **Mr. D. E. Lowndes,** the works manager, has been appointed works director. **Mr. H. W. F. Ireland** still retains his interest as director of the parent company, National Plastics, Ltd., and the subsidiaries, British Moulded Plastics, Ltd., and Moulded Products, Ltd. **Mr. B. C. Westall** and **Mr. J. Eerdmans** have resigned their directorships of Scottish Plastics, Ltd., and Mr. C. Milton Marshall has been elected to the board.

Mr. A. A. Gates, secretary of Christy Bros. & Co., Ltd., has joined the board of the company.

Mr. W. R. Jones, B.Sc., chief chemist with the Rotherham Corporation Electricity Department, has been selected from a short list by the Swansea Corporation Electricity Committee for the appointment of chief chemist at the Tir John power station in succession to **Mr. T. G. Williams,** who has been appointed fuel technologist with the National Coal Board. From 1928 to 1930 Mr. Jones was assistant chemist to Richard Thomas & Co., Ltd., Llanelly, and during the next four years was chief chemist to D. I. Williams & Co. In 1934 he joined the Ford Motor Co., Ltd., as senior power station chemist at Dagenham and took up his present position at Rotherham in 1938. He is a member of the Institute of Fuel and an associate of the Royal Institution of Chemistry.

Mr. J. G. Curtis, whose appointment as burgh electrical engineer and manager of Kirkcaldy was recently announced, was educated at Creighton School, Carlisle, and Carlisle Technical School. He served his apprenticeship with the Carlisle Corporation Electricity Department, with which undertaking he subsequently held the appointments of junior engineer and district engineer. He went to Kirkcaldy in November, 1943, as mains superintendent and was appointed deputy electrical engineer in January, 1946, becoming burgh electrical engineer in June last.

Mr. F. R. Dawson, A.M.I.E.E., deputy distribution engineer with the St. Pancras Electricity and Public Lighting Department, has been appointed mains superintendent with the Tunbridge Wells Electricity Department. He received his technical training at Hackney Technical Institute and with the County of London Electric Supply Co., Ltd. (Woodford and Romford district). From 1935 to 1936 he was assistant charge engineer at the City Road substation of the County of London Co. and from 1936 to 1941 served as mains assistant in the Bethnal Green Electricity Department. He then went to St. Pancras as senior mains assistant, being appointed deputy distribution engineer last year.

Mr. R. Slatter, assistant meter superintendent at Lincoln, has been appointed meter superintendent in the Kettering Electricity Department. He was formerly with the Grimsby Corporation.

Mr. S. H. Hancox recently retired from the position of engineer and manager of the Hobart (Tasmania) municipal tramways which he had held for twenty-six years. He was formerly with the Sydney tramways and the Queensland Railways. Mr. Hancox is succeeded by his assistant, **Mr. H. B. Murn,** who, before going to Hobart, was with the Adelaide Municipal Tramways Trust.

Fine weather and a good attendance of both spectators and athletes, made the fifth annual Ekco athletic meeting held at the Ekco Sports Ground on July 26th a great success. An Essex County Championship event, the one mile relay, attracted much attention. The inter-departmental tug-of-war between the Ekco Plastics, Offices and Radio Divisions went to Plastics Division who beat Offices by two pulls to one. The Offices were eventual winners of

the inter-departmental athletic trophy. At the conclusion of the meeting Mr. D. Willman, chairman of the Ekco Social and Sports Club, called upon Mr. E. K. Cole, managing director, who congratulated all those taking part on their fine athletic display. Mrs. Cole presented the prizes.

Despite unpleasant weather conditions on July 19th, nearly 380 members of the staff of the S.W. & S. Electric Power Co., with their relatives and friends, attended a garden party in the grounds at the central offices of the company at Mucklow Hill, Halesowen. Many games of skill and side-shows provided entertainment for the visitors, and in spite of a late start and interruptions by heavy showers, a full programme of novelty sporting events was carried out. A number of children's races attracted many entries and treasure hunts for children and adults created much interest and enthusiasm. At the conclusion of the sports, Mr. D. H. Kendon, general manager, welcomed the visitors from the outlying district offices of the company, and also the relatives and friends of the staff, and introduced Mrs. D. H. Kendon, who presented the prizes.

Wills.—Mr. G. Wüthrich, manager, chief engineer and secretary of Oerlikon, Ltd., who died on December 16th last, left £14,134 gross in England, with net personalty £13,513.

Mr. W. E. Chinn, M.I.E.E., telephone manager, Nottingham, who died on March 1st last, left £6,035 gross, with net personalty £5,309.

Mr. G. Herbert, of Benjamin Electric, Ltd., who died on January 3rd, left £9,177 gross, with net personalty £8,063.

Mr. G. Middlemiss, of Brancepeth, Co. Durham, retired electrical engineer, who died on March 14th, left £1,415.

Sir Alexander Galloway Erskine-Hill, Bt., a director of the Scottish Power Co., Ltd., Metropolitan Electric Supply Co., Ltd., and other companies, who died on June 6th, left personal estate in England and Scotland valued at £21,876.

London J.E.A.

AMONG the matters reported to the London and Home Counties Joint Electricity Authority at its meeting yesterday (Thursday) were the following:—

Income Tax Ruling.—Section 15 of the Finance Act, 1937, provides for an annual depreciation allowance of 1 per cent on the capital cost of certain buildings, including site. In this connection an appeal from a decision of the Special Commissioners by the Lancashire Power Company was heard in the King's Bench Division in June. The Crown claimed that in applying the provisions of the Section to generating stations it was necessary to have regard to each compartment into which the main building was divided to determine whether the compartment qualified for the allowance. Mr. Justice Macnaghten held that the power station was one building. A second point was whether buildings containing transformers were eligible. The Crown contended that they were not as a transformer was not power-driven machinery. The Court held, however, that a transformer was an electrical machine and that consequently the building which housed it, even where such building had no roof, was eligible. The company was awarded costs against the Crown. No official intimation has been received whether the Crown intends to appeal against the decision in this case.

The Finance Committee of the J.E.A. reports that income tax settlements to date have been made on behalf of the Authority subject to a decision of the Courts in this case. The committee has approved formal provisional notice given to the Inland Revenue to preserve the position regarding election under the proviso Section 7 (2) of the Income Tax Act, 1945, under which the allowance under Section 15, Finance Act, 1937, will continue for 1946-47 and the four following years unless the taxpayer elects that Section 15 shall no longer apply.

Adjustment of Tariffs.—The Finance Committee states that it has given instructions for rebates in charges to industrial consumers in all suitable cases as suggested by the Electricity Commissioners. In respect of the period of restrictions last February it is estimated that allowances will amount to £3,000. As regards future two-part tariff charges the Commissioners suggested that where the terms include a standing charge based on the highest kW or kVA of demand taken over a period longer than a month, consumers should be given the alternative of having the charge based on the highest demand in each month, the monthly charge not to exceed one-twelfth of the annual charge plus 10 per cent, or such higher figure as might be agreed with the Commissioners. The J.E.A. is to investigate the adequacy of a 10 per cent increase.

The "J.E.A. Journal."—Up to the earlier part of the war the J.E.A. produced the "Bus-Bar"—a little journal devoted mainly to staff activities. The war killed it and it has not been possible until now to replace it. The new production, the "J.E.A. Journal," although smaller, is well up to the pre-war standard and the first number is devoted largely to the recent sports meeting of which there are some excellent photographs. Messages are contributed by the chairman (Mr. H. E. Goodrich, M.P.), the general manager (Mr. Norman Elliott, O.B.E.) and the clerk and finance officer (Mr. A. L. Burnell).

PARLIAMENTARY NEWS

By Our Special Reporter

LAST week in the House of Commons Mr. Sidney Marshall asked the Minister of Supply what expenditure of dollars had been incurred in the purchase of Diesel generating sets from the United States in the last two years.

Mr. Wilmot said the answer was $2,850,420.

Lamps and Economy

Mr. Sorensen asked the Minister of Fuel and Power what was the proportionate difference in the consumption of coal involved in burning electric lamps of the most economical and of inferior type, and whether steps would be taken to prohibit the manufacture of uneconomic electric lamps.

Mr. Shinwell said that the ordinary filament lamp consumed from three to eight times as much coal as a discharge lamp, according to the type of discharge lamp used. He was informed by the Minister of Supply that the demand for lamps of the latter type exceeded the supply, that he was actively encouraging their development. He did not consider it practicable to prohibit the manufacture of the ordinary filament lamp.

Mr. Sorensen asked whether the Minister had made inquiries to find out how long it would be before a more economical lamp was available.

Mr. Shinwell replied that if Mr. Sorensen had in mind the fluorescent type of lamp, or lamps which used sodium or mercury, he was afraid it would take some time because the parts were in process of manufacture, and there were many difficulties.

Electric Mains Connections

Mr. Vane asked the Minister of Fuel and Power on what grounds he continued to give priority to new houses over old houses for connection to the electric mains, even where applications had been outstanding for many years and where no alternative method of lighting was available.

Mr. Shinwell said it was obviously essential to install modern methods of lighting when building new houses. With the present shortage of materials this was bound to mean that some older houses could not immediately be supplied with electric lighting in substitution for other forms of lighting.

Use of Private Generating Plant

Mr. Attewell asked the Minister of Labour whether firms who had installed plant for generating electricity in emergency would be allowed to use such plant during peak load periods and work the normal working hours.

Mr. George Isaacs said that his statement of July 22nd referred only to electricity supplied by electricity undertakings and was not related to the use of privately owned plant. As regarded working hours, he could not anticipate the schemes which might be agreed by the Regional Boards and their district or local committees.

A.E.U. and Polish Labour

Mr. Gammans asked the Minister of Labour what action he proposed to take in view of the recent decision made by the Amalgamated Engineering Union under which all Poles employed in that industry were being compelled to leave their jobs.

Mr. Isaacs said that the Confederation of Shipbuilding and Engineering Trade Unions had informed him that they were unable to conclude a national agreement on the employment of Poles in engineering or to take any further action in the matter. He was now taking the matter up with the individual unions and had asked for an early meeting of the Amalgamated Engineering Union executive. The effect of the decision on the production of mining machinery and electrical plant was one of great seriousness.

Electricity Bill

New Clause Carried Against Government

THE Electricity Bill has been read the third time and passed in the House of Lords. The Commons considered the Lords amendments on Tuesday last, and the Royal Assent is expected to be given before Parliament rises for the summer adjournment to-day (Friday).

In the final stage the Lord Chancellor said that the measure had occasioned a great deal of energy but, he was glad to say, had given rise to no heat. Their lordships would have to wait for the Gas Bill for that.

Viscount Ridley begged the Government, if it was proposed to nationalize the gas industry, to think again before they began to put all the control of operation, details and policy into a central organization. He hoped the Government realized the harm that might be done by tying up the essential services in an over-elaborate control machine.

On the earlier report stage, the Government sustained a defeat. Viscount Swinton moved a new clause to provide that the Central Authority should take over the electricity assets of holding companies, but should not take over their extraneous assets, which, if acquired, would subsequently be sold.

The Earl of Lytton supported the new clause. He said that in so far as the holding companies possessed any electrical assets they wanted the Central Authority to take all of them. It was their desire that the Central Authority should be at liberty to take anything it might require for the purpose of generating or distributing electricity. But, in regard to the extraneous assets which were not wanted, and which, if

taken over, the Central Authority would be obliged subsequently to sell, the holding companies wished to have the option of retaining them.

Lord Rennell, who also supported the new clause, said it would get the Government out of a great difficulty.

The Lord Chancellor said he was sorry that he could not accept the new clause. There were, substantially, eleven holding companies which would be involved and there was one other that wanted to come in. The amounts involved of these extraneous assets, whether foreign securities or internal assets, were not substantial at all having regard to the value of the electricity undertakings, and most of them, oddly enough, consisted of some sort of transport undertakings which, of course, would be taken over under the Transport Bill.

The new clause was carried against the Government by 65 votes to 14.

Load-Spreading Schemes

Regional Arrangements

DISCUSSIONS are proceeding all over the country of means of conforming with the Government's demand for the spreading of the industrial electrical load to reduce the peak demand during next winter.

Mr. George Gibson, chairman of the North-West Regional Board for Industry, stated last week that all firms in the area are to be told that their demand during the three peak periods must be reduced by a third. He expected them to have their plans ready by the beginning of September for putting into operation on October 1st. Firms would achieve the reduction by working night-shifts, by "staggered" hours, "staggered" days or by other means approved by the Board and the local electricity undertakings and the plans would be worked out in consultation with employees.

There might have to be exceptions in special cases but few of these were anticipated. Concerns which had installed oil-engine generating plants would be considered to have made their contribution.

The *Manchester Guardian* says that representatives of the cotton industry are to meet to consider their plans on August 11th.

At a Bradford meeting the chairman of the local committee of the Regional Board, Mr. W. Wright, said that the Board wanted all the schemes for the Region to be ready by the middle of September for putting into effect on October 1st. The chairmen of sixteen local authorities present at the meeting pledged themselves to bring employers' and trade union representatives together as soon as possible.

Mr. T. H. Carr, city electrical engineer of Bradford, warned firms with their own steam generating plant that they might not be able to obtain sufficient coal for their boilers next winter. Mr. O. G. Cook, the Bingley electrical engineer, said that it was not sufficient to restrict industrial consumers and let the domestic consumer go on unchecked.

Mr. H. W. Howard, chairman of the Eastern Regional Board, announced last week that the Government had approved a scheme for spreading the industrial load prepared by the Board, and technical details were being worked out. Members of all the District Committees would meet in Cambridge on August 27th and would afterwards prepare schemes for their own districts. It was stated later that it was being proposed that industrial concerns should, in turn, be entirely cut off for one day—probably every fifth day—and that an endeavour was being made to avoid night shifts.

E.P.E.A. Activities

AT a recent meeting of the National Executive Council of the Electrical Power Engineers' Association it was reported that 330 members had been given permission to hold membership of other trade unions, the bulk of them being members of the National Association of Local Government Officers. An agreement has been reached between the E.P.E.A. and the Electrical Trades Union (through the Standing Joint Committee) that neither body will admit to membership anybody whose terms of service are governed by agreements applicable to the other body, except for valid reasons; disputes under this proviso are to be submitted to the Joint Committee.

Grading of Draughtsmen. — The Council decided to defer action on a resolution calling for the establishment of grades for draughtsmen and wayleave officers and for their recognition as members of the technical staff.

Salaries and Hours. — A resolution was carried to provide for application being made to the National Joint Board for an increase of £100 in the basic salaries of the scale operating on January 1st, 1947.

The Association has made a claim for the reduction of the working week of members to 38 hours. The employers' representatives have said that they are prepared to grant a 44-hour week but will not go beyond that. The Council passed a resolution agreeing to accept 42 hours (and not more) as a temporary measure while continuing to press for 38 hours.

It was noted that the employers had conceded maximum continuous rating as the basis for classification of stations.

Developments in Illumination

The proceedings of the Convention held by the Illuminating Engineering Society from May 14th to 16th, 1946, have now been published in one volume (115 pages ; 10s. net to non-members). The publication includes the text of seven technical papers and four popular talks, all mainly concerned with laboratory and practical developments in lighting during and since the war.

COMMERCE and INDUSTRY

Public Corporations. Electrical Employment Statistics.

AT the June conference of the Institute of Public Administration, Sir Arthur Street, deputy-chairman of the National Coal Board, delivered an address on "The Public Corporation in British Experience" which the Institute (18, Ashley Place, Westminster, S.W.1) has now published in book form at 2s. 6d. In his introductory remarks, Sir Arthur Street described the nature of the public board and the rise of public trading and mentioned the Central Electricity Board as the first national board, followed by the B.B.C., the British Sugar Corporation and others. He pointed out that in 1946 and 1947 eight such organisations had arisen or were in process of creation, including the British Electricity Authority, whose functions were briefly described.

Sir Arthur defended Civil Service methods and maintained that public boards and their staffs must develop certain good qualities which were found in civil servants who, however, had no monopoly in them. He enunciated principles for the operation of public boards and suggested means by which the boards' activities could be co-ordinated in matters in which they came into contact or overlapped.

Farm Exhibition at Wellington

The Wellington District Electricity Co., Ltd., recently arranged a four-day "Electricity on the Farm" Exhibition. The whole of the equipment, marquees, etc., were moved from the similar exhibition held earlier at Minehead, a report of which appeared in the *Electrical Review* of July 11th. Mr. A. H. Short, M.I.E.E., engineer and manager of the Minehead and Wellington Companies, was responsible for the exhibition, and the arrangements were made by Mr. W. J. Guscott, A.M.I.E.E., A.M.I.B.A.E., agricultural development engineer of the two companies and Mr. G. V. Underwood, A.M.I.E.E., consumers' engineer.

Luton Training Schemes

Since 1943 the Luton Corporation electricity undertaking has had schemes for the training of engineering and trade apprenticeships and we have now received from Mr. C. T. Melling, the borough electrical engineer, a revised edition of a booklet describing the arrangements. Copies of this have been sent to schools and colleges in the area of supply.

The engineering apprenticeship course (generally five years) is flexible to meet individual needs; it is divided into five general sections in each of which experience in all details of operation and administration are covered: they comprise power station, mains engineering, meter department, consumer activities, and construction and drawing-office work. On one day a week the apprentices attend the Luton Technical College or a similar institution. Arrangements have been made with some of the largest electrical manufacturers to provide fourth-year training courses; for instance, the Metropolitan-Vickers Co. accommodates apprentices and arranges for them to continue their studies at the Works School, the Manchester College of Technology or the Salford Technical College. Salaries at present range from £90 per annum at 16 to £220 at 21.

The trade apprenticeships are designed to produce mechanical fitters, cable plumber jointers and meter mechanicians. Trade apprentices are paid a rising percentage of the craftsmen's rates, reaching 64 per cent at 20, and outstanding apprentices may be transferred to the engineering apprenticeship course.

The number of apprentices is limited to thirty to ensure a high quality in the entrants to the industry and to enable the Department to offer positions to all successful apprentices.

"Power to Spare"

Under this title, Oldham & Sons, Ltd., Denton, Manchester, have produced the first number of a quarterly journal devoted primarily to various aspects of electric battery production and use but with a wider scope. In this issue are an article, in English and Dutch, on industrial revival in the Netherlands; an article on advertising—"Barnum in Modern Dress"; a description of the automobile servicing business of one of the company's distributors; an article on lead ("Precious Metal"); and a review of the British coal industry. The publication is handsomely produced with good illustrations and careful use of colour.

Institute of Metals

The annual autumn meeting of the Institute of Metals will be held in Glasgow from September 23rd to 26th. The headquarters will be at the Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, Glasgow. Particulars of the meeting can be obtained from the secretary, Mr. S. C. Guillan, 4, Grosvenor Gardens, London, S.W.1.

Electrician's Reinstatement

The Aberdeen Reinstatement Committee recently decided that an ex-Serviceman formerly employed as an apprentice electrician should be reinstated by the employers, Bell & Robertson, of Aberdeen. For the firm it was contended that the man (Mr. G. R. Milne) was given employment by them in 1943 only until he was called up by the R.A.F. for which he had volunteered. They also stated that on account

of shortage of materials they had difficulty in finding enough work for their present employees, although they admitted that they had not dismissed any journeymen during the past year.

The Committee, in ordering the applicant's reinstatement as a journeyman electrician, held that he had established his rights under the Act and had precedence over two electricians subsequently employed by the firm. It also awarded Mr. Milne £11 15s. as compensation.

Electrician's Successful Claim

An electrician, Mr John Yates, of Stoneleigh, Ewell, Surrey, was awarded £164 16s. 8d. and costs against his former employers, Troup Curtis & Co., Ltd., engineers, Victoria Dock Road, E., at Bow County Court on July 29th, when he sued them for £185 loss of pay between November, 1942, and January, 1946. He alleged that he had been reduced from the position of charge-hand to an electrician without notice from the management.

The Judge held that an electrician promoted to charge-hand under the Essential Work Order was entitled to be paid charge-hand rates for the rest of his employment.

Mr Yates said he joined the company in 1941 as an electrician, but in September of that year was sent to Cardiff and promoted to charge-hand for which he received an extra 4½d. an hour. He was then sent to Gainsborough and returned to London in 1943 working as an electrician until he terminated his employment in January, 1946.

An area officer of the Electrical Trades Union said that a charge-hand had the same power over his men as a foreman and that he had known of charge-hands working under other charge-hands and still being paid the extra 4½d. an hour.

Batti-Wallahs' Society

Some interesting facts relating to the formation and the work of R.E.M.E. were given at last week's luncheon of the Batti-Wallahs' Society by Maj. Gen. Sir E. Bertram Rowcroft. Colonel H. J. Wellingham, the president, in introducing Sir Bertram, mentioned that he was head of R.E.M.E. from its formation in 1942 until January of this year.

Sir Bertram said that at the beginning of the war the engineering repairs for the Army were divided between three services, the R.E., the R.A.S.C. and the R.A.O.C. As a result of a report by the Beveridge Committee R.E.M.E. was formed and men were drawn from all three of these corps. He then went on to describe the invaluable work carried out by R.E.M.E. in the Middle East, the Far East and for the British Liberation Army, and mentioned that after the war R.E.M.E. repaired 70,000 vehicles in connection with the rehabilitation of the German transport system. Speaking of the future, Sir Bertram said that the electrification of the army was going ahead and in a few years the electrical side would be as important as the mechanical side.

A vote of thanks to the speaker was proposed by Mr. S. W. Melsom. The next luncheon of the Society will be held on September 25th.

English Electric's New Blackburn Premises

The English Electric Co. took advantage of the birthday celebrations of Alderman E. Porter, J.P., M.P. for Warrington, to invite him to open their new showroom and sub-office in Preston New Road, Blackburn, on July 29th. At a luncheon at Waddington Fells, Clitheroe, the Alderman (who is chairman of Blackburn Corporation Electricity Committee) received from Mr. E. B. Banks, the company's commercial manager, who presided, an electric radiator to mark his anniversary. Those present included committee chairmen and chief engineers from various towns in the North West.

Mr. Banks, having spoken of the company's world-wide ramifications, said that these connections had been the means of bringing to this country a vast amount of business and they appreciated the urge of increasing our exports and purchasing power at this particular time. He mentioned the services of Sir George Nelson, chairman of the company, in heading a delegation of technicians to negotiate trade

Alderman E. Porter, M.P., opening the English Electric Co.'s new premises at Blackburn. Included in the group are Mr. E. B. Banks (commercial manager), Mr. G. F. Sills and Mr. R. H. Harral (borough electrical engineer)

with Russia, and the company's close associations with the power stations of Lancashire. For some time they had been considering opening out in the northern part of Lancashire (an off-shoot of Manchester headquarters) and Blackburn was chosen for a new showroom and sub-offices.

Alderman Porter said that like other electrical concerns in Lancashire, the Blackburn Committee had done a great deal of spade-work to encourage textile industrialists to modernize their plant and equipment.

Alderman Porter touched on personal associations with Sir George Nelson, and with the Samlesbury Aerodrome. He was glad to pay his tribute to the company both from a pioneering and a craft point of view. Despite labour and fuel shortages, he felt sure they could anticipate great possibilities for the future.

Electrical Employment

Statistics published in the July *Ministry of Labour Gazette* show that the number of men employed in the electrical engineering industry in May was 105,800, the same as in the previous month. The number of women employed dropped slightly (from 51,400 to 51,200). In electrical wiring and contracting the total number of people employed increased from 52,900 to 53,100 and in the electrical apparatus, cables, lamps, etc., group the number rose from 268,800 to 270,000. In the accompanying table comparisons are given with mid-1946 and mid-1939.

EMPLOYMENT DURING MAY (THOUSANDS)

BRANCH	MALES (14-65)			FEMALES (14-60)			TOTAL		
	Mid-1939	Mid-1946	May, 1947	Mid-1939	Mid-1946	May, 1947	Mid-1939	Mid-1946	May, 1947
Electrical engineering	105·9	99·9	105·8	28·0	53·2	51·2	133·9	153·1	157·0
Electrical wiring and contracting ..	38·9	45·5	47·4	2·8	5·4	5·7	41·7	50·9	53·1
Electrical apparatus, cables, lamps, etc.	116·4	117·4	138·2	79·5	126·8	131·8	195·9	244·2	270·0

The same issue contains an analysis of insured persons who were unemployed (wholly, temporarily and casuals) at June 16th last. The number for the electrical engineering industry in the United Kingdom was 2,085 (including 585 women). This compares with 2,495 (661 women) a month before. Fewer were also unemployed in the electrical wiring and contracting industry—1,238 (64 women) against 1,533 (69 women)—and in electrical apparatus, cable, lamps, etc., manufacture—3,015 (1,404 women) compared with 3,647 (1,486 women) at May 12th.

Belgian Electrical Trade

The report of the Ateliers de Construction Electriques de Charleroi for the past year states that the net profit was sufficient to wipe out the losses sustained during the war years, leaving a small balance to be carried forward. Dealing with the question of American and British competition, the directors say that as regards the United States, electrical engineering concerns in that country have been meeting with success in some markets by reason of lower prices than those quoted by Belgian concerns, but mostly in light classes of material, the Belgian concern claiming to be still masters of the situation as regards heavy electrical plant. With respect to British competition, although English prices are at present lower than Belgian, the long periods for delivery of new material now ruling are, it is considered, having the effect of turning buyers to other countries.

Institute of Transport's New Premises

The Council of the Institute of Transport has secured a new home for the Institute. It has purchased the lease of 80, Portland Place, London, W.1—a spacious house situated within five minutes' walk of Oxford Circus, and a few minutes of Regent's Park and Great Portland Street stations. A letter is being sent to members by Mr. R. Stuart Pilcher, president, in which he appeals for increasing support for the endowment fund which has already reached £60,000 and which it is necessary should be built up to £100,000 if the new premises are to be used to promote the work of the Institute to the maximum. Cheques and postal orders should be made payable to the Institute of Transport (Endowment Fund) and contributors can spread their donations over seven years and by doing so enable the Institute to recover income tax at the standard rate on the annual payments. Forms may be had from the Secretary of the Institute, 15, Savoy Street, W.C.2.

Inquest on Clarence Dock Employee

An inquest was held at Liverpool on July 30th on John Schofield, aged forty-one, auxiliary plant attendant, who died after an explosion at the Clarence Dock power station on July 23rd. It was stated that Schofield was working in the reactor room when the explosion occurred. He died from burns. A verdict of " Accidental death " was recorded, the deputy coroner saying that those in charge had taken every precaution to prevent such an accident.

Trade Publications

United Steel Companies, Ltd., 17, Westbourne Road, Sheffield, 10.—Illustrated technical brochure (SF. 234) on the properties and testing of various kinds of creep-resisting steels developed

during the last twelve years, with short bibliography on the behaviour of metals at elevated temperatures.

English Electric Co., Ltd., Queen's House, Kingsway, London, W.C.2.—Illustrated folder (HE/109) describing a propeller runner with feathering blades and anti-racing hydro-brake for water turbines.

United Insulator Co., Ltd., Oakcroft Road, Tolworth, Surbiton, Surrey.—Illustrated catalogue of mica and ceramic capacitors, hermetic seals, metallised bushes and insulators for radio and electronic equipment.

L.M.S. Euston Offices

In connection with the reconstruction of office accommodation at Euston Station, London, the L.M.S. Railway Co. has placed a contract with Rashleigh Phipps & Co., Ltd., for lighting and inter-office telephonic communications.

Car Radio Purchase Tax

By the Purchase Tax (Charges (No. 2) Order, 1947, wireless receiving sets designed for use on road vehicles and valves suitable for use with such sets are chargeable for purchase tax at the basic rate of 33⅓ per cent.

Fusion Welding

Whessoe, Ltd., have been placed by Lloyd's Register of Shipping on their list of recognized manufacturers of Class I welded pressure vessels (fusion welding).

Trade Announcements

J. DYSON & CO., LTD.—The telephone number has been changed to Bradford 28394.

CRESSALL MANUFACTURING CO., LTD., Birmingham.—The telephone number has been changed to Aston Cross 2666.

SERVICE ELECTRIC CO., LTD.—The offices, works and stores are now at Water Road, Alperton, Middlesex (telephone Perivale 7251).

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"ASTRAL" refrigerators.

"GORDON MAJOR" vacuum cleaners.

"HAPTON" food mixer.

Trade Marks

APPLICATION has been made for the registration of the following trade marks. Objections may be entered within one month from July 30th:—

BREEZE. No. 647,193, Class 7. Electric generating apparatus and electric ignition engines and starting apparatus (not for land vehicles) and parts thereof not included in other classes.—Plessey Co., Ltd., 56, Vicarage Lane, Ilford, Essex.

SMITHS. No. 638,830, Class 9. Aircraft instruments, including electrical position indicators; electric accumulators, electric batteries, gauges, speedometers, thermometers, warning lights, being instrument panel indicators and electric switches for fuel control gauges.—S. Smith & Sons (England), Ltd., Cricklewood Works, Edgware Road, London, N.W.2.

ANCALITE. No. 645,679, Class 9. Insulated electric wire, electric fuse wire and electric cables.—British Insulated Callender's Cables, Ltd., 103, Mount Street, London, W.1.

BELBRO. No. 646,838, Class 9. Chemical and scientific apparatus and instruments, electrolysis outfits, electrolytic cells, gasfilled electric discharge tubes, etc.—Bell Bros. (Domestic), Ltd., Westford Mills, Wellington, Somerset.

RED ROUTE RADIO (design). No. 647,495, Class 9. Wireless, television, telegraphic and telephonic instruments and apparatus and parts not included in other classes, but not including wire.—British & Overseas Radiovision, Ltd., Enfield Works, 191, Francis Road, Leyton, London, E.10.

THE TORRENT CHARGER (design). No. B647,692, Class 9. Electric battery chargers.—City Engineering Co. (Boreham Wood), Ltd., Manor Way, Boreham Wood, Herts.

FAREDEX. No. 648,474. Class 9. Wireless receiving sets (complete).—Rikh & Edwards, Ltd., 11, Ludgate Hill, London, E.C.4.

DREAMLIGHT. No. B646,793, Class 11. Electrical apparatus for lighting, heating and cooking, and parts not included in other classes.—Dorland Electric Co., Ltd., 38, Brompton Road, London, S.W.3.

I.E.E. North-Eastern Students

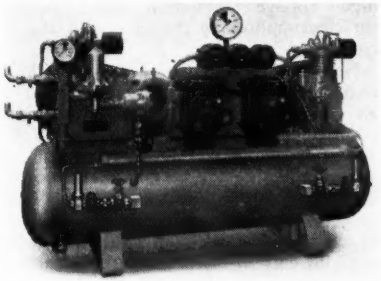
ON August 13th the North-Eastern Students' Section of the Institution of Electrical Engineers is visiting the Morrison Busty Colliery, Annfield Plain, and on September 28th the annual outing will take place to the Ullswater area. Applications for tickets for the colliery visit should be made to Mr. S. A. Walker, 41, Deuchar Street, Newcastle-on-Tyne, 2, and for the annual outing to Mr. B. L. A. Ellings, 4, Rothbury Terrace, Newcastle-on-Tyne, 6. The annual dance is to be held at the Old Assembly Rooms, Newcastle, on November 7th and tickets (4s. each) can be obtained in September from Mr. Ellings. After September 30th tickets will be charged at 7s. 6d.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Air Compressors

IN addition to their use for air-blast circuit breakers, the type AC range of compressors made by the ENGLISH ELECTRIC CO., LTD., Stafford, will serve equally well as the source of air at high pressure for most ordinary purposes. These two- and three-stage air-cooled sets are self-contained and fully automatic, consisting of one or two compressors mounted on a horizontal



Duplicate two-stage air compressors mounted on air receiver vessel

air receiver, together with all ancillary control, drying and distribution gear, forming a compact floor-mounting assembly. Working pressures range from 250 to 600 lb per sq in. with free air delivery rates of from 7·1 to 17·5 cu ft per minute and secondary pressures can be adjusted by means of a reducing valve.

In the end plates of the all-welded receiver are large inspection holes and " English Electric" a.c. or d.c. driving motors are normally fitted. Complete protection, both on the pneumatic and electrical sides, is provided, together with all necessary gauges, blow-off valves and air distribution gear.

Moulded Magnets

To simplify the making of small permanent magnets and to minimize expensive machining operations the PLESSEY CO., LTD., Vicarage Lane, Ilford, Essex, has introduced a pressed powder known as " Caslox." It consists of iron-cobalt oxides mixed with a small quantity of plastic binder, which can be moulded into almost any shape.

Once the necessary tools have been made, the magnets can be pressed out rapidly in quantities. Examples are the magnets in gramophone pick-up heads, telephones, hearing-aid ear-pieces, novelties, toys and similar equipment needing short magnets of large area to work in open magnetic circuits. The density of the material is 3·2 g/c.c. and its specific resistance is $0{\cdot}5 \times 10^6$ ohms/cm cube. It has a very high coercive force, so that the influence of disturbing magnetic fields is small and, when moulded, " Caslox " is reasonably stable at temperatures up to 70 deg F, being unaffected by humidity and atmospheric impurities.

Table and Exhaust Fans

A table fan, which is adjustable by means of a wing nut at the base, has been announced by the STANDARD ELECTRICAL ENGINEERING CO., Stanelect House, 16, Heneage Lane, Leadenhall Street, London, E.C.3. The squirrel-cage shaded-pole motor is enclosed in a pressed-steel casing with sintered bronze bearings impregnated with lubricant. The chromium-plated wire guard is detachable for access to the four aluminium blades of 10 in. diameter and the 9 in. diameter base has a keyhole slot to enable it to be hooked on to a wall. Grey and colour combination finishes are available.

An exhaust fan is also made with 7·5 in. diameter blades for moving up to 250 cu ft of air per minute the frame diameter being 11 in. with 5·25 in. projection and requiring an 8·5 in. aperture. Each model weighs 7 lb.

Trousers Creaser

To the range of household appliances manufactured by CLAYTON, LEWIS & MILLER, LTD., Manilla Road, Southend-on-Sea, and marketed under the trade name of " Clem," there has been added a heated trousers creaser. The outer casing is made of moulded insulating material and a permanent connector is attached for plugging into a mains outlet socket.

Electric trousers creaser

Floral Wall Brackets

Illuminated wall brackets, consisting of a glass-panelled inverted cone containing artificial flowers and foliage, are being made by MR. A. J. MILLER, The Studios, Hartlip Place, Kent. The floral bunch, being made of glazed leather, is washable and is arranged to be lifted out for that purpose. Hanging lights and special designs for alcoves and corners can be provided as well as a table decorative piece mounted on a flat glass base with subdued internal illumination.

Mercury-Arc Rectifiers

Incomplete Control Range of the Grid-controlled Type for Battery Charging

By R. Wells, A.M.I.E.E.

EXPERIMENTAL work carried out by the author on grid-controlled rectifiers of the cold-cathode or mercury-pool type includes an investigation into the loss of control of the current over certain ranges, which may prevent the charging of secondary cells at the correct rate. For example, control from 0 to 50 A may be obtained and between 60 A and normal full load, but not from 50 to 60 A. Further trouble is experienced if the lower limit of the uncontrollable increment is just within the rectifier current rating and the upper limit is in excess of it. In this case overloading may occur and fuses or circuit breakers may operate if any attempt is made to obtain a charging current greater than the lower limit value.

The uncontrollable increment of current occurs when the separate current pulses emanating from each anode in order of commutation and passing through the valve cathode and battery load circuit become of sufficient cyclic duration to form a continuous current and in so doing cause a reduction in valve arc-voltage drop.

The conclusion drawn is that the occurrence of the phenomenon can be restricted to a low value and small range of current by designing such rectifiers with a relatively high voltage regulation and providing sufficient smoothing inductance in the d.c. circuit.

Normally, when putting the battery on charge, the rectifier is switched on to the a.c. supply and the d.c. output voltage adjusted to zero by a grid phase controller. The a.c. supply is then switched off and after connecting the battery to the rectifier d.c. terminals and switching the a.c. supply on again, the grid phase controller is adjusted in the "raise" direction until the desired charging current is reached.

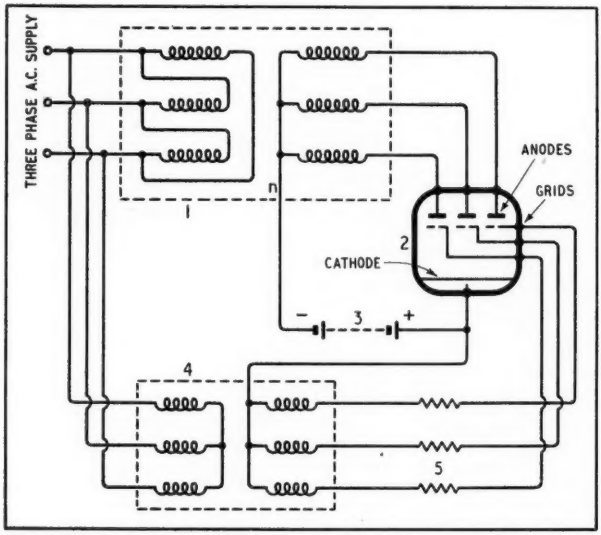


Fig. 1.—Circuit diagram 1, delta/star main transformer. 2, three-anode grid valve. 3, battery load. 4, grid phase controller. 5, limiting resistances

Cause of Incomplete Control Range

As a typical example take the case of equipment consisting of a delta/star main transformer having a phase-to-neutral secondary voltage of 100-V peak value; a three-anode, grid-controlled, glass-rectifying valve; a 33-V battery load; and a phase controller, the sine-wave output voltage of which is applied to the grids via current limiting resistances (Fig. 1). This grid supply is sinusoidal with respect to the cathode, i.e. no biasing potential was used. The phenomenon is less marked as the number of secondary phases is increased, but the

three-phase case has been taken as an example.

Assuming zero grid critical voltage (it is usually of the order of 15 V positive with respect to the cathode) a retardation of grid voltage with respect to anode voltage of 180 electrical degrees will produce the initial condition of zero output voltage with the anode firing point at M (Fig. 2). If the phase controller is moved in the "raise" direction until the angle of retardation is 160 electrical degrees, corresponding to an anode firing point at N, no charging current will flow, because between M and N the anode potential is negative with respect to the cathode. Had the load no back e.m.f. (such as a resistance load) the rectifier would have given a finite output voltage according to the average value of the line V.U.N.M., neglecting the rectifying valve arc-voltage drop. Still assuming zero arc-voltage drop and neglecting initial anode striking voltage, further reduction of the angle of retardation will cause a charging current to flow. For example, suppose the angle of retardation is now 120 electrical degrees and the anode firing point is in consequence at R, then the rectifier output voltage is in consequence in excess of the battery voltage by an average value corresponding to that of the line S.Q.R.N. above the cathode potential line, the current in the battery is then discontinuous and will consist of a pulse from each anode in turn. Each pulse will flow under the influence of the voltage wave Q.R.N. and will be of similar shape (neglecting the effects of inductance) and will have instantaneous values that depend upon the internal resistance of the battery.

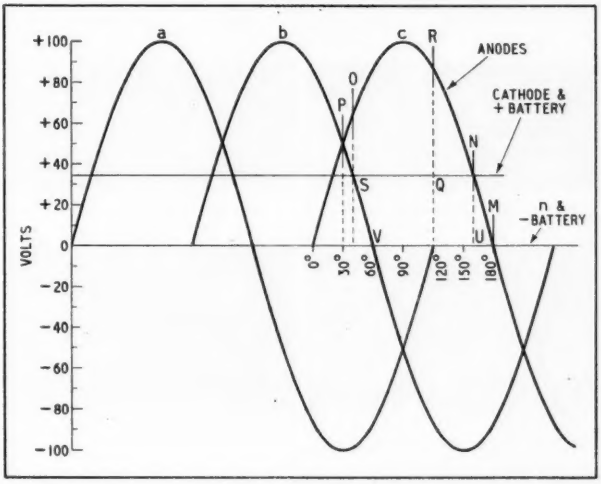


Fig. 2.—Potential diagram for transformer secondary, rectifying valve and battery

Still further reduction of the angle of retardation will cause the charging current to increase until, at 40 electrical degrees and anode firing point at O, the current flowing through the battery becomes continuous and depends for its value upon the available voltage S.O.R.N. Control over the charging current at this last step should, therefore, be smooth and stepless as at other stages, but it is here the uncontrollable increment of current occurs. Reduction from 40 to 30 electrical degrees and change of anode firing point from O to P will create overlap of the anode firing periods and a final increase of the charging current up to a maximum.

Reduction from 30 electrical degrees and anode firing point P to the in-phase condition at zero retardation of the grid and anode voltages will have no effect, because P is the natural commutation point and the anode cannot fire earlier in the cycle, since the preceding anode (b) in order of commutation is at a higher potential.

Of the four oscillograms of d.c. charging current reproduced in Fig. 3, A, B and C show progressively increasing current pulses. C is at a current value just below the lower limit of the uncontrollable increment, the current pulses almost reaching the stage where they join and form a continuous charging current, oscillogram D is a record of the current at a value corresponding to the upper limit of the uncontrollable increment and, therefore, in this case, no d.c. charging current between the average value represented by C (22 A) and that represented by D (48 A) could be obtained.

This increase in the average value of

current from C to D is due to an increase in peak value rather than to a change of wave shape. The unobtainable range of current values coincides with conditions of grid voltage phase angle, battery-voltage magnitude and main transformer secondary voltage so as to create anode-current pulses of sufficient time duration just to form a continuous cathode current (see Appendix).

Observation of the valve reveals that at a point on the control range immediately before the sudden increase in current there is

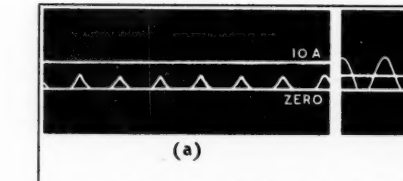


Fig. 3.—Oscillograms of d.c. charging current. Average values of current: A, 1·0 A; B, 10·0 A; C, 22 A; D, 48 A

but one cathode spot on the mercury surface, irrespective of the value of the current, while as soon as the uncontrollable increment has been passed a second cathode spot makes its appearance.

The cathode spot is the small luminous flame which moves at random about the surface of the cathode mercury pool and is the active part of the cathode from which emission takes place. In general, as the load on a rectifier of this type is increased so does the number of cathode spots increase, each of which has seemingly a current-carrying capacity of approximately 30 A. The conclusion is that if the cathode current is not continuous, the cathode spot will not sub-divide when it carries a short-time current pulse, even if it be of a magnitude greater than that which would cause sub-division by a continuous current.

D.C. Volt-Ampere Characteristic of Valve

The relationship between arc current and arc-voltage drop taken by passing d.c. through the valve (nominal capacity 50 A) from the anode electrodes to the cathode is shown in Fig. 4. The curve is divided into sections by well-defined points of inflexion at approximately 28 and 59 A, at which sub-division of the cathode spot took place. From A to B the current increases up to 28 A and is carried by one cathode spot, while from B to E the current between 28 and 59 A is carried by two cathode spots; E to G represents a part of the three-cathode spot section. The dotted lines B-C and E-F have been extrapolated and show that, for any particular cathode current above 28 A, the arc-voltage drop, if the current is carried by two or three spots, is less than it is if carried by only one spot. For example, at ordinate H.D.C., a short current pulse of magnitude 50 A would fail to sub-divide the cathode spot and would result in an arc drop of 20·7V (HC); a continuous current of 50 A, however, would cause sub-division of the cathode spot and would result in an arc drop of 19·7 V (HD).

Effect of Change of Arc-Voltage Drop

This difference in arc-voltage drop must appear as an increase of voltage at the rectifier d.c. terminals and hence at the battery terminals and will cause an increase of charging current equal to $\frac{e}{Ri}$, where e is the increase of voltage and Ri is the internal resistance of the battery.

The internal resistance of the 33-V battery was 0·04 ohm and an increase of 1 V at the terminals would increase current by $\frac{1}{0{\cdot}04}$ or 25 A; this agrees closely with the increase recorded between oscillogram C and oscillogram D, i.e. 48 to 22 or 26 A.

In raising the charging current from zero to the lower limit of the uncontrollable increment, the cathode current consists of discontinuous current pulses from each anode in turn. Under this condition the cathode

spot will not sub-divide, no matter what the instantaneous value of each separate current pulse may be, and owing to this "overloading" of the cathode spot a relatively high volt drop takes place in the valve. At the point where the uncontrollable increment occurs, the separate current pulses have joined to form a continuous current and the cathode spot sub-divides into its natural number of components (approximately load amperes divided by 30) and the volt drop in the bulb becomes normal. The extra voltage as represented by the difference of valve - voltage drop appears at the rectifier-battery terminals and causes the large current increment, since the circuit is sensibly one of balanced e.m.f's with the current limited by the low battery internal resistance.

There appears to be no ready means of eliminating the trouble, but steps can be taken to reduce its effect and control the current value at which it occurs. The inclusion of additional resistance in the d.c. circuit would render the charging current less critical to small changes in rectifier-output voltage, but the I^2R losses would reduce the efficiency of the rectifier.

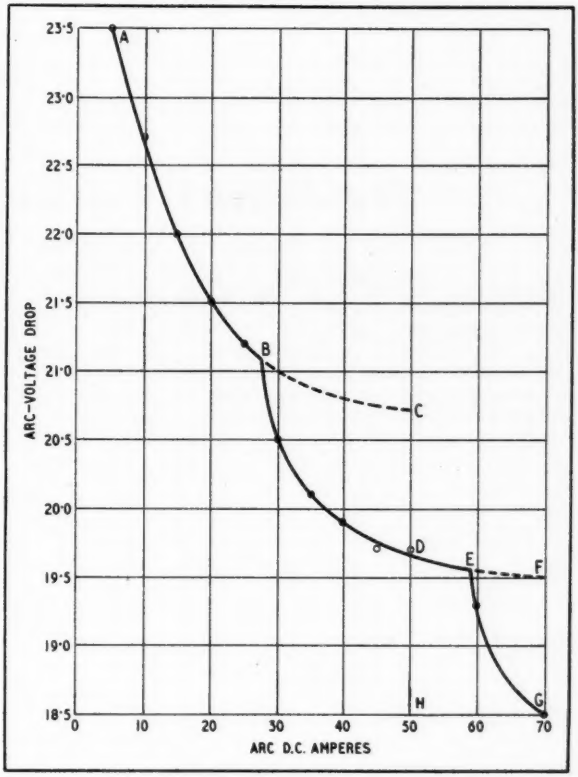


Fig. 4. — D.c. volt-ampere characteristic of glass rectifying valve

Inductance may be included in the d.c. circuit with the object of making the cathode current continuous at a low value. This method has two disadvantages, however. The choke must have a large number of turns for it to be effective at less than 30 A, while it must be of a copper section to carry the full-load d.c., possibly 200 to 300 A, usually making it of a prohibitive size and cost. The effective inclusion of such an inductance makes the charging current critical to small changes of voltage on the mains or in valve-voltage drop due to movement of the cathode spot. This is so because the condition of e.m.f. balance must now hold good the whole time and not only for part of each cycle, as is the case with non-continuous cathode currents.

This sensitivity gives rise to an unsteady charging current. It could be largely overcome by the use of a "fixed-cathode" valve (one having a small metallic protrusion on the mercury surface through extension of the cathode lead-in rod, thus anchoring the cathode spot to the protrusion). So far, however, this type of valve has been made only for small currents, and the problem does not arise unless the d.c. current is greater than about 30 A.

The rectifier can be designed with a relatively high voltage regulation, either by the use of a high-reactance transformer or by the use of secondary-circuit reactance in the

form of anode chokes. This has the same effect as the inclusion of resistance in the d.c. circuit, but has the advantage of creating voltage regulation in a wattless manner. This method provides the best remedy, particularly as a smaller d.c. circuit inductance will now prove effective and can be used so that not only does the uncontrollable increment occur at a low value of current, but its range is small by virtue of the high voltage regulation of the rectifier.

Appendix

The angle of retardation (α) at which the uncontrollable increment occurs may be expressed for the three-phase case as $\alpha = \frac{\Pi}{3} - \mathrm{Sin}^{-1}\frac{EB}{Em}$, where α = angle of displacement between grid and anode volts, EB = battery voltage and Em = maximum value of transformer-secondary phase-to-neutral voltage.

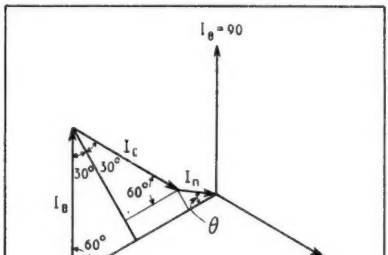
This holds good only if $\frac{EB}{Em}$ is less than 0·5, for, if the battery voltage is greater than the point of intersection of the anode-voltage waves, the separate current pulses from each anode can only unite to form a continuous cathode current under the influence of inductance. The author's thanks are due to Hackbridge & Hewittic Electric Co., Ltd., for permission to use the information given above.

Residual Currents

Method of Calculation

By G. W. Stubbings,
B.Sc., A.M.I.E.E.

THE magnitude and phase of the residual or neutral current corresponding to the known line currents from a three-phase, four-wire source of a.c. supply can be calculated by resolving the vectors of the line currents into components in phase and in quadrature with some reference vector such as that of a star voltage. When, as is often approximately the case, the phase angles of the three line currents are equal and the single-phase component power factors alike, the calculation of the residual current is best carried out by resolving two of the line current vectors into in-phase and quadrature components with reference to the third current vector, as in this condition the phase differences of the three pairs of line current are all 120 deg. The magnitude and phase of the neutral current with equal single-phase power factors can be then given by concise formulæ suited for rapid practical calculation.



The vector diagram of a system of unbalanced line currents having equal phase angles relative to the balanced star voltages, and so having phase differences of 120 deg, is shown above. If I_A is the greatest line current, the component of the residual current in phase with the reversed I_A current vector has a magnitude of $I_A - (I_B + I_C)\cos 60 \text{ deg} = I_A - \frac{1}{2}(I_B + I_C)$. Also, the quadrature component of the residual current relative to the reversed I_A vector has a magnitude of $(I_B - I_C)\sin 60 \text{ deg} = \frac{\sqrt{3}}{2}(I_B - I_C)$. Let the difference of the magnitudes of the line currents be thus denoted: $(I_A - I_B) = d_1$, $(I_A - I_C) = d_2$, $(I_B - I_C) = d_3$, then the in-phase component of the residual current is $\frac{1}{2}(d_1 + d_2)$ and the quadrature component is $\frac{\sqrt{3}}{2} d_3$. If the magnitude of the residual current is denoted by I_n then $I_n^2 = \frac{1}{4}[(d_1 + d_2)^2 + 3 d_3^2]$ ..... (1)

This equation can be changed to one of more convenient form by noting that $d_3 = I_B - I_C = (I_A - I_C) - (I_A - I_B) = d_2 - d_1$ ..... (2)

for $I_n^2 = \frac{1}{4}[4d_3^2 + (d_1 + d_2)^2 - (d_2 - d_1)^2] = \frac{1}{4}(4d_3^2 + 4d_1d_2)$, so that $I_n = \sqrt{(d_3^2 + d_1 d_2)}$ (3)

As I_A is the greatest current, d_1 and d_2 are essentially positive and no ambiguity of sign arises in the calculation of d_1 d_2.

We can arrive at another formula in the following way. From equations (1) and (2) we see that $I_n^2 = \frac{1}{4}[2d_3^2 + (d_2 - d_1)^2 + (d_1 + d_2)^2] = \frac{1}{4}(2d_3^2 + 2d_1^2 + 2d_2^2)$, so that

$$I_n = \sqrt{\left(\frac{d_1^2 + d_2^2 + d_3^2}{2}\right)} \quad \ldots\ldots\ldots (4)$$

This formula is symmetrical, only the squares of d_1, d_2 and d_3 are involved, so that the differences can be taken in the arithmetical sense, irrespective of algebraic sign.

The phase angle θ of the residual current relative to the reversed I_A vector has a tangent equal to the ratio of the quadrature to the in-phase components. This phase angle is therefore given by the equation $\tan \theta = \frac{\sqrt{3}d_3}{d_1 + d_2}$. The sense of this phase angle will be that of the greater of the two currents corresponding to d_3, relative to I_A.

If $I_A = 100$, $I_B = 90$ and $I_C = 75$, as marked on the diagram, then $d_1 = 10$, $d_2 = 25$ and $d_3 = 15$. From equation (3), $I_n^2 = 225 + 250 = 475$ and $I_n = 21{\cdot}8$ approx. From equation (4) $I_n^2 = \frac{1}{2}(100 + 625 + 225) = \frac{1}{2} \times 950 = 475$, as before. Also $\tan \theta = \frac{\sqrt{3} \times 15}{35} = \frac{3\sqrt{3}}{7} = 0{\cdot}745$ and, as I_B is greater than I_C and is the lagging current relative to I_A, the residual current lags the reversed I_A current by an angle arc tan 0·745 = 36½ deg approximately and consequently leads the I_C current by an angle of (60 − 36½) = 23½ deg.

Training Technologists

Courses of University Standard

THE contribution which the major technical colleges (colleges of technology) can make to the urgent need for qualified scientists and technologists is outlined in a report published last week. The report has been prepared by a sub-committee of the Parliamentary and Scientific Committee and adopted by the main Committee subject to dissent on some points by representatives of the Institute of Physics. It deals solely with those colleges which provide technological courses of a standard comparable with those in the universities.

To restore and enhance our industrial position the output of qualified scientists and technologists should be at least doubled. Colleges of technology could contribute some 5,000 to 7,000 a year by providing, if not already doing so, courses of university standard. It is essential that a nationally and internationally recognized qualification should be available, the only one that fulfils the condition being a bachelor degree. University degrees are awarded in a limited number of technological studies both at the universities and at departments of technology recognized by the local university, but there is a wide range of courses for which no adequate reward is available.

The report attaches the utmost importance to the regional organization of higher technological education and the complete implementation of the recommendations of the Minister that an Advisory Council and an Academic Board should be set up in each region. It is considered that the Minister should immediately proceed to establish the National Council of Technology. Matters which the National Council should consider include whether a new organization for granting degrees is needed, and whether in special circumstances it should itself seek the power to confer degrees in technology.

For certain important industries requiring only a relatively small number of technologists national colleges with adequate equipment should be developed without delay. Research in colleges of technology, and also the training of post-graduate technologists in research methods, should receive every encouragement. In general the research should be applied in character and done in collaboration with the industry and its research association. The Minister should ask the Burnham Committee on Salaries to give special consideration to the formulation of improved scales for staffs in departments of colleges of technology recognized as providing courses of university standard. Salaries should be considered not only in relation to those in the universities but also to those in industry. The Teachers' Superannuation Act should be amended to provide for lecturers spending "refresher" periods in industry.

It is thought that the number of technical State scholarships available to students wishing to study technological subjects should be extended and consideration should be given to the establishment of a loan fund to assist deserving students.

Storm Damage.—Electricity supplies were interrupted for periods of up to seven hours in Angus and Perthshire towns last week as a result of damage to overhead lines in a severe thunderstorm.

ELECTRICITY SUPPLY

Northfleet Power Station Site. Ash Disposal at Liverpool.

Birkenhead. — LOAN. — The Corporation is applying for consent to borrow £15,739 for new substations, mains and replacement of obsolete switchgear.

Conway.—CONSUMERS TO BENEFIT.—At a meeting of the Town Council it was announced that the electricity undertaking had received several large "windfalls," including approximately £4,000 in respect of bulk supplies. The reserve fund was now £14,000 greater than was permitted and the excess would be returned to consumers. On accounts for the year ending September 30th a special discount of 20 per cent would be allowed; this would absorb £6,000. Reductions in charges would be made from October.

Darlington.—HIGHER CHARGES.—As from the end of June the surcharge on electricity accounts is to be raised from 15 to 33⅓ per cent.

Glasgow.—INQUIRY INTO WATER SCHEME.—A parliamentary commission presided over by Lord Saltoun recently inquired into a proposal by the Lanarkshire County Council to reduce by 1,300,000 gallons the amount of compensation water daily diverted into the River Clyde from the Council's Camp Reservoir, in order to serve the growing industrial and domestic needs. Objections were raised by the Lanarkshire Hydro-Electric Co., Ltd., the Gourock Ropework Co., Ltd., and James McGregor & Co., who claimed that any reduction in the volume of water would reduce the output of their electrical plant. Steam generation to compensate for the loss of power output would, it was contended, cost thirty times more, and the use of more coal would be involved at a time when such a step was undesirable.

Gravesend.—SITE FOR LARGE POWER STATION.—Reference was made in the Electricity Committee's minutes which came before the Council at its recent meeting to a proposal to construct a new power station in the area. The borough electrical engineer (Mr. G. V. Harrap) reported that the Central Electricity Board had instructed him to open negotiations for the purchase of the necessary land. The only suitable site was in Northfleet; this would accommodate an initial installation of 120,000 kW costing approximately £5,000,000. If the site were found to be suitable further development might take place involving a total capital expenditure of approximately £14,000,000. The electrical engineer was congratulated upon his successful efforts to secure a new power station in the area.

Liverpool.—ASH DISPOSAL.—The city electrical engineer has been authorized to charter a hopper vessel from the Mersey Docks and Harbour Board for the purpose of experimenting in the disposal at sea of ash from the Clarence Dock generating station.

Margate. — ELECTRIC VEHICLE CHARGING TARIFF.—The Margate, Broadstairs and District Electricity Board is introducing a new tariff for electric battery vehicle charging. The rate is to be 1d. per kWh, plus the present emergency increase of 15 per cent, together with a hire charge of 10s. per quarter for a time switch in order to cut off the supply during peak load periods.

Overseas

Belgium.—POWER SHORTAGE.—It is reported from Brussels that the Belgian Government is about to appoint a special national commission to inquire into the urgent problem of increasing the country's electric power supply.

Brazil.—INCREASED OUTPUT.—The Brazilian Traction, Light & Power Co., Ltd., which claims to produce and distribute through its operating companies over 60 per cent of the total power output of Brazil, reports record sales during 1946. These aggregated 2,825·5 million kWh compared with 2,606·4 million in 1945, while the number of consumers increased from 694,957 to 731,751.

Canada.—LARGE CONSTRUCTION SCHEMES.—A $93,000,000 construction programme of five major power developments will increase the capacity of the Ontario Hydro-Electric Power Commission's system to nearly 2,300,000 h.p. in another four years. Mr. R. L. Hearn, general manager of the Commission, outlining the programme, said that the new plants would add 571,000 h.p. to the present normal capacity of 1,720,000 h.p. Some 4,000 construction workers are now employed on these projects which are at Des Joachims (360,000 h.p.), Stewartville (81,000 h.p.), DeCew Falls (70,000 h.p.), Aguasabon (53,000 h.p.) and Ear Falls (7,500 h.p.). Approved, but not yet started, is a $19,000,000 tunnel-site development on the Mississagi river, 20 miles north-east of Thessalon, in Algoma, planned to provide 56,500 h.p.

A $40,000,000 programme being undertaken by the Shawinigan Water & Power Co. includes the completion of the 195,000-h.p. development at Shawinigan Falls, extensions and improvements to the transmission and distribution systems and the initial construction work on a new development at La Trenche, on the Upper St. Maurice River, of approximately 350,000 h.p. which is scheduled to be started in 1949.

Peru.—PROPOSED NEW POWER STATION.—The 1946 report of the Lima Light & Power Co. states that the requirements for electric power have become more pressing, and the company has therefore sponsored the formation of Energia Hidroelectrica Andina S.A. (Hidrandina). The latter company will deal with the building of a new hydro-electric station at Moyopampa, near the village of Chosica.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The General Electric Co., Ltd. — The importance of increased production in the economic recovery of the country was emphasized by Sir Harry Railing (chairman) at the annual meeting held on July 31st. After reviewing the accounts for the past year Sir Harry said that we could not continue to buy food and raw materials or maintain full employment unless we produced more for export. Our imports during the first five months of 1947 were £240 millions more than exports, leaving a deficit at the rate of £580 millions per year. For the present financial year the deficit was estimated at about £450 millions. Increased production could only be achieved by an increase of output per man-week. Reductions of hours at this moment would delay the recovery of the country. Increased standards of living, increased leisure and increased amenities must follow increased production, not precede it.

The difficulties which confronted their company were, first, the general ones confronting every industry in the country, and secondly some specific ones peculiar to the industries in which they were engaged. The country was faced with a shortage of man-power and raw materials. The most pressing need was to close the existing gap between demand and supply for coal, steel and power The second necessity was to increase the number of workers in the productive industries. They were struggling to overcome the difficulties which at present confronted them in regard to adequate buildings, new tools, labour supply and raw materials.

They had successfully changed over from the production of war materials to normal peace-time production, but they were handicapped by the necessity to change their plans with the ever-changing picture dictated by national requirements. As an example, they were urged by the Government to extend the output of domestic cookers and refrigerators in order to relieve the housewife's burden at home and to increase exports, but the factories constructed for this purpose were now unable, on account of shortage of raw materials, to work fully either for the home market or for abroad. It was essential that these difficulties should be overcome as early as possible, otherwise the markets for these commodities would be lost permanently to this country. The same applied to the restriction of manufacture to "utility" goods. The manufacture of high-class consumer apparatus must go hand in hand with the former. Utility goods would in the end be manufactured locally abroad and it was only by keeping ahead in advanced design and in quality production that we could expect to maintain and ultimately increase our export markets.

They had increased, and intended to increase still further, their output of capital goods in connection with generating plant, both in the electrical and mechanical field, and in connection with transmission and distribution plant and traction work. They had replaced the manufacturing capacity in telephone and radio transmission plant which was destroyed during the war, and had extended it by additional works at Coventry and Middlesbrough. They had started new works for cooking and domestic equipment at Swinton and Walsall and had increased their manufacturing capacity for lamps and valves by taking over works in Lancashire and on the North-East Coast.

Pye, Ltd.—At the annual meeting the chairman (Mr. C. O. Stanley) referred to the difficulties of the past year and said that although they had spent a large amount of money and energy on reconstruction the trading profit had been about the same. Shortages had led to high prices in the industry and the position had been worsened by Government control. Endeavours to divert industry to development areas had resulted in newcomers to industry being given licences to manufacture and this had intensified the scramble for materials. It was wrong that newcomers should be given privileges over older-established concerns. They had only produced a third of the projected number of television sets because of the shortage of cathode-ray tubes. Their "Videosonic" system had aroused great interest in home and overseas markets. Projection television for the home had been developed in their laboratories but the high cost at present placed it beyond the purchasing power of the bulk of the people. Mr. Stanley complained of the price which the company had to pay for valves stating that they could be purchased from America at a third of the price paid to British manufacturers.

The British Vacuum Cleaner & Engineering Co., Ltd., reports a trading profit of £122,861 for 1945-46 (against £133,759) and a net profit of £45,005 (against £44,752). Tax reserve and N.D.C. absorb £24,000 (£22,000) and the final ordinary dividend is raised from 13¾ to 20 per cent, making 26¼ per cent for the year (against 20 per cent); £14,832 (£14,658) is carried forward.

Revo Electric Co., Ltd.—The accounts for the year ended March 31st show a profit, after depreciation, of £404,928, compared with £279,221 for 1945-46. To this is added £24,333 from the previous year's profit in respect of adjustment contracts. Taxation absorbs

£262,662 (£196,616) and after providing £3,190 (£3,423) for staff fund and £30,000 (nil) for auxiliary power plant there was a net balance of £217,331 (£160,386). It is proposed to transfer £50,000 (£25,000) to general reserve and £20,000 (£10,000) to stock contingencies. The final ordinary dividend, as already announced, is 12½ per cent, plus a cash bonus of 10 per cent, making 27½ per cent for the year (against 20 per cent) and £91,746 (£85,880) is carried forward.

Allen West & Co., Ltd.—In his statement presented at the recent annual meeting, the chairman (Mr. W. H. Lancaster, M.C.), said that the company had sold its output for many months to come and had taken steps to combat, shortages of power to some extent. Owing to the results of their research they had been able to use alternative materials when they were available.

The Kalgoorlie Electric Power & Lighting Corporation, Ltd., reports a profit for 1946 of £30,497 (against £24,090). Depreciation reserve receives £14,000 (same), general reserve £7,000 (£9,000) and taxation absorbs £2,000 (£4,327.) The year's dividend is maintained at 7 per cent and £10,228 (£9,950) is carried forward.

Aberdare Cables, Ltd., has declared an interim dividend of 6 per cent (unchanged).

The London Electric Supply Corporation, Ltd., is again paying an interim ordinary dividend of 2 per cent, less tax.

New Companies

Meggitt Marsh & Co., Ltd.—Registered July 26th. Capital, £8,000. Electricians, electrical engineers, etc. Directors: P. S. Meggitt, Edith M. Meggitt, D. R. Maddox and C. G. Marsh. Regd. office: Bourne Chambers, St. Peter's Road, Bournemouth.

Maco Refrigeration & Electrical Co., Ltd.—Registered July 25th. Capital, £5,000. Directors: R. C. Cooke, W. H. Martin, and O. Cowley. Regd. office: Parkstile Chambers, Market Street, Kettering.

Mallory Batteries, Ltd.—Registered July 25th. Capital, £250,000. To acquire the business of P. R. Mallory & Co., Ltd. (about to go into liquidation), and to carry on the business of manufacturers of, and dealers in, batteries, accumulators, etc. Subscribers: F. W. Edmunds and F. R. Furber. Solicitors: Slaughter & May, 18, Austin Friars, E.C.2.

Radiohm Distribution, Ltd.—Registered July 25th. Capital, £200. Electricians, radio and electrical engineers, etc. Directors: C. H. de Solla and W. G. Harrison. Regd. office: 7a, Station Approach, Cannon Street, E.C.4.

Thoday & Longman, Ltd.—Registered July 25th. Capital, £2,000. Electrical engineers and general electrical installation contractors, etc. Directors: E. G. Thoday and H. B. Longman. Regd. office: 73, High Street, Lymington, Hants.

Peak Telephone Installation Co., Ltd.—Registered July 25th. Capital, £500. Directors: F. O'Shaughnessy, G. Tarrier, and D. Murphy. Regd. office: 26, Paradise Square, Sheffield.

Wheeler Electrical Supplies (Wholesale), Ltd.—Registered July 25th. Capital, £2,500. Directors: C. S. Wheeler and S. Wheeler. Regd. office: 59, Osmaston Road, Derby.

Smith Brothers, Rotherham, Ltd.—Registered July 12th. Capital, £2,000. To acquire that part of the business, goodwill and undertaking of wholesale factors, dealers and merchants in electrical goods, etc., of Smith Bros., Rotherham, Ltd., carrying on business in High Street, Rotherham. Permanent directors: Mrs. R. M. Nicholson and Mrs. M. A. Wilson. Solicitors: Parker Rhodes & Co., Rotherham.

E. J. Orton, Ltd.—Registered July 15th. Capital, £2,000. To acquire the business of an electrical contractor carried on by E. J. Orton at 15, St. Mary's Place, Nottingham. Directors: E. J. Orton, P. C. Cullen and H. S. Saxton. Regd. office: 15, St. Mary's Place, Nottingham.

George R. Clay, Ltd.—Registered July 23rd. Capital, £3,000. To acquire the business of electrical contractors carried on at 47, Market Street, Watford, as George R. Clay. Directors: G. R. Clay and T. H. Hallett. Regd. office: 18, Hanover Street, W.1.

Electro Motor Repair Co., Ltd.—Capital, £1,500. To acquire the business of motor and dynamo repairers carried on at Willow Place, S.W., as the Electric Motor Repair Co. Directors: H. J. Chiswell and S. H. Porcas. Regd. office: 5-7, Willow Place, S.W.1.

Electro Developments (Leicester), Ltd.—Registered July 22nd. Capital, £2,000. To acquire the business of an electrical and radio component manufacturer carried on by C. P. Charlton at Yeoman Street, Leicester, as Electrical Developments Co. Directors: C. P. Charlton and Mrs. E. M. Charlton. Regd. office: 13, Yeoman Street, Leicester.

Neo-Chrome, Ltd.—Registered in Edinburgh July 17th. Capital, £10,000. Manufacturers of, and dealers in, all kinds of electrical appliances. Directors: W. Herd, G. J. C. Herd and T. Herd. Regd. office: 14, Cromwell Street, Glasgow.

Midland Refrigeration & Electrical Co., Ltd.—Registered July 8th. Capital, £200. Objects: Manufacturers and installers of refrigerators and refrigeration and ice cream appliances, etc. Permanent directors: H. Rhodes and F. H. Beard. Regd. office: 15, Penrith Close, Sheffield.

R. C. Hilton & Co., Ltd.—Registered July 18th. Capital, £1,500. Electricians, electrical engineers and consultants, etc. Directors: R. C. Hilton and R. Hilton. Regd. office: Bradley's Chambers, 14, Castlegate, Clitheroe.

Electrical Services (Dorset), Ltd.—Registered July 12th. Capital, £705. Electrical and wireless engineers and contractors, etc. Directors: A. Hawkes and L. J. Halfacre. Regd. office: Cross Road, Verwood, Dorset.

Newman Brothers of Kensington, Ltd.—Registered June 19th. Capital, £2,000. To acquire the business of an electrician and dealer in electrical and radio supplies now carried on by J. Newman as Newman Bros., at 158, Old Brompton Road, S.W.5, and at Merrow, Surrey. Directors: J. Newman and Mrs. Gladys Newman, R. A. Newman and W. C. Titcombe.

Pemberton & Dotchon, Ltd.—Registered June 20th. Capital, £3,000. To acquire the business of electrical engineers and marine wireless engineers carried on by Pemberton & Dotchon at 35-36, Mount Stuart Square, Cardiff. Directors: W. F. Pemberton and E. H. Dotchon. Regd. office: 35, Mount Stuart Square, Cardiff.

Hotplate Supply & Repair Co., Ltd.—Registered July 2nd. Capital, £2,500. To acquire the business of manufacturers and repairers of hotplates and electrical components carried on by W. J. Dawson at 1-8, Orsett Mews, as the Hotplate Supply & Repair Co. Directors: W. J. Dawson and H. J. R. Burns. Regd. office: 1, Orsett Mews, W.2.

Winterbottom & Walshaw, Ltd.—Registered July 2nd. Capital, £300. Electrical engineers and general electrical installation contractors, etc. Directors: J. Winterbottom, B. M. Walshaw and A. Walshaw. Regd. office: 12, Boothroyd Lane, Dewsbury.

J. T. E. Brown, Ltd.—Registered July 18th. Capital, £1,000. Manufacturers of, and dealers in, wireless and television sets, artificial lighting apparatus, electrical fittings, etc. Directors: A. P. Carvell and Mrs. Gwendoline M. Carvell. Regd. office: 3-5, Bank Street, Rugby.

D. & S. Electrical Products, Ltd.—Registered June 19th. Capital, £500. Electricians, agents, etc. Directors: G. S. Dignum and C. H. Sayle. Regd. office: 70, Berwick Street, W.1.

Udall Electrical Engineering Co., Ltd.—Registered June 19th. Capital, £100. Directors: J. Udall and H. W. Arnold. Regd. office: 31a, Market Place, Great Bridge, Tipton, Staffs.

Electrical & Radio Services (Weymouth), Ltd.—Registered July 10th. Capital, £850. Directors: R. L. F. Tilsed and R. A. Panrucker. Regd. office: 26, Lennox Street, Weymouth, Dorset.

Nye Contractors Plant Hire, Ltd.—Registered July 1st. Capital, £100. Electric lighting and equipment specialists, etc. Directors: D. Howes and Wm. K. Kent-Nye. Regd. office: 29, Junction Road, Burgess Hill.

Brookside (Tools), Ltd.—Registered July 18th. Capital, £1,000. Electrical engineers and contractors, etc. Directors: A. Butterfield and R. Meadows. Regd. office: 13, Yellow House Lane, Southport.

John Downton (Electric), Ltd.—Registered July 7th. Capital, £1,000. To acquire the business of electrical equipment manufacturers and engineers carried on by James Downton and others as "John Downton & Co." at 89, High Street, Epping, Essex. Directors: H. C. Binstead, W. E. Done, J. Downton, R. G. McClelland and S. A. H. White. Regd. office: 89, High Street, Epping, Essex.

J. H. Round, Ltd.—Registered June 26th. Capital, £1,000. To acquire the business of a dealer in electrical accessories, etc., now carried on by J. H. Round at 43, Herbert Road, Handsworth, Birmingham. Subscribers: J. H. Round and G. Hennefor. J. H. Round signs as director. Regd. office: 43, Herbert Road, Handsworth, Birmingham.

Allesley Electrical Services, Ltd.—Registered July 1st. Capital, £1,500. To acquire the business of Allesley Electrical Services carried on by E. W. Bridgewater at Allesley and Coventry. Directors: E. W. Bridgewater and H. P. Mansel-Edwards. Regd. office: 18, Lionfields Avenue, Allesley, Nr. Coventry.

Walker Leigh (Electrical), Ltd.—Registered July 18th. Capital, £3,000. Electrical, Diesel, internal combustion, steam and other power engineers, etc. Directors: F. W. Leigh, C. G. Leigh, H. Jackson and J. W. A. Pheasant. Regd. office: West Dock Street, Grimsby.

Ray Electricals (Folkestone), Ltd.—Registered June 25th. Capital, £5,000. Manufacturers and dealers in magnetos, dynamos, batteries, etc. Permanent directors: P. L. Chadwick (managing director) and Mrs. D. C. Chadwick. Secretary: J. F. Cullingham. Regd. office: 42, Bedford Avenue, W.C.1.

Porchester Electrical Supply Co., Ltd.—Registered June 24th. Capital, £100. Subscribers: W. A. Harris and H. H. Henderson. Secretary: W. A. Harris. Regd. office: 7, Chalfont Court, 236, Baker Street, N.W.1.

E. Soper & Son, Ltd.—Registered June 24th. Capital, £200. Electrical, mechanical and general engineers and contractors, radio engineers, etc. Permanent directors: E. Soper, R. B. Kitchen and W. Codd. Regd. office: 1, Holker Road, Buxton, Derby.

Tudor Service (Electrical), Ltd.—Registered June 13th. Capital, £1,000. Directors: W. Miller and G. A. Chapman. Regd. office: 215, Coulsdon Road, Old Coulsdon, Surrey.

H. & G. Rewinds, Ltd.—Registered June 25th. Capital, £500. Electrical equipment specialists, etc. Permanent directors: F. Naylor and T. H. E. Curtis.

Increases of Capital

Palace Electrical Co., Ltd.—Capital increased by £4,500 beyond the registered capital of £1,000. (The new shares are preferential as to capital, but bear no dividend and carry no voting rights.)

Barlow-Whitney Ltd.—Capital increased by £20,000 beyond the registered capital of £10,000.

Bylock Electric, Ltd.—Capital increased by £85,000 beyond the registered capital of £15,000.

STOCKS AND SHARES

STOCK Exchange markets have suffered devastating falls in prices since a week ago. The first indication of a slump came through the consol market, where British Government securities, under the leadership of 2½ per cent consols, fell heavily on the Government statement as to the gravity of the economic crisis. The Prime Minister promised an announcement, to be made on the Wednesday of this week, as to the Government's plans for meeting the economic situation, and, in advance of this, quotations for stocks and shares were unable to throw off the weakness that had previously attacked them. There were spasmodic recoveries from the worst prices touched, but, compared with the prices of a month or two ago, to-day's figures make a poor showing.

Decline and Fall

Discrimination previously exercised in favour of electrical equipment shares went by the board during the relapse of the industrial markets. Associated Electrical Industries shares, which have long been the most persistently supported stock in the electrical market, lost practically 10s. during the week and now stand at 82s. 6d. General Electrics, now 87s., have lost 3s. on the week and 9s. 3d. in a fortnight. Investment equities such as those of the leading cable manufacturers suffered with the rest. Losses of half-a-crown or thereabouts are shown by British Insulated Callender's, 42s., Johnson & Phillips, 75s., and Telegraph Constructions, 50s. Crompton Parkinsons are down to 27s. and English Electrics to 57s. 6d. In the telephone group, Automatic Telephones shed a further 5s. to 62s. 6d. Chloride Electrical Storage, now 5-5/16, Revo at 56s. 3d. and Arons, 57s. 6d., have lost much of the recent improvements.

Further Changes

Radio and kindred shares, already on the weak side, have yielded more ground. E.M.I. are no better than 21s. 9d., while Deccas at 45s. 6d. have lost 7s. on the week. Cossors are down to 22s., and E. K. Coles to 20s. Among engineering stocks, Babcock & Wilcox and Hopkinsons fell about half-a-sovereign to 68s. and 105s. respectively. International Combustion at 47s. 6d. have declined by 7s. 6d., and Tube Investments by 12s. 6d. to 6⅝. Ever Ready at 39s. 3d., Walsall Conduits at 58s. 9d., Electric Construction, at 62s. 6d., Reyrolles at 75s., have all dropped considerably, and the depressing recital could be extended to include a score of others.

Electricity Supply

On the assumption that the Electricity Bill becomes law, electricity supply shares should be more or less insulated from surrounding events. The compensation stock is to be issued in fixed amounts, on terms in line with gilt-edged values at the time of the take-over. In theory, therefore, an intervening fall in the gilt-edged market should be of no particular concern to stockholders. Indeed, if the Electricity Stock were issued to-day, it would have to bear interest at about 3 per cent, whereas a month or two ago a rate of 2½ per cent was the best that stockholders could anticipate. In practice, however, the market has not shown complete immunity from the melancholy environment, although the week's losses have generally been restricted to moderate amounts.

Miscellaneous Matters

Like electricity supply shares, the Central Electricity Board stocks have not escaped depression, but the set-back has been trivial in comparison with the descent of other gilt-edged prices. The same can be said of conditions in the Home Railway market. Tillings, however, have shed 8s. 6d. to 58s., and B.E.T. deferred at 1,215 was marked down 170 points. Cable & Wireless stocks showed spasmodic resistance but finished the week with declines of 14 points in the ordinary, at 145½, and of 6½ in the preference, at 110. Globe Telegraph were sympathetically dull at 39s. 3d., and Oriental Telephones receded to 49s. 6d.

Seven Months' Comparison

In view of the extremely heavy falls amongst investment issues, it is of particular interest to look back for comparison of to-day's prices against those of January last. This table of half a dozen London electricity supply companies' shares indicates the resistance shown by the market to the slump conditions that have prevailed in other departments:—

Ordinary	Jan. 2	Aug. 1	Fall
City of London ..	34/–	30/9	3/3
County of London	47/6	45/–	2/6
London Assoc. Elec.	27/–	27/–	—
Metropolitan ..	47/–	43/6	3/6
Northmet Power ..	44/9	43/6	1/3
South London ..	33/–	31/6	1/6

In the Scottish and Provincial group, the falls in some cases have been larger than this. Nevertheless the depreciation looks small in comparison with the experience of other markets. Unpopular in every other respect, the Electricity Bill has provided unexpected protection to the stocks concerned.

Australian Philips Concern

THE new factory of Philips Electrical Industries of Australia, Ltd., who about a year ago decided to move from Sydney to Adelaide, was recently opened by the Premier (Mr. Playford). The site covers 75 acres and when the factory is fully staffed employment will be given to over 2,000 workers. The programme includes the manufacture of electronic valves, communication and sound reproduction equipment, X-ray apparatus, and a variety of household appliances.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. *each*) *may be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

1943

BRITISH Thomson-Houston Co., Ltd.—" Electric valve system for controlling the charging of a condenser and its discharge into a welding or other load circuit." 5148. April 1st, 1942. (590464.)

Western Electric Co., Inc.—" Treatment of silicon." 12304. April 4th, 1941. (590458.)

Standard Telephones & Cables, Ltd.—" Vacuum tube structure." 16574. April 30th, 1942. (590500.) " Arrangements employing energy pulses for guiding moving vehicles." 20747. October 8th, 1942. (590459.) " Radio navigational systems." 20748. June 28th, 1941. (590460.)

1944

Marconi's Wireless Telegraph Co., Ltd.—" Electron discharge devices." 1585. May 30th, 1942. (590462.) " Television transmitting system." 8399. August 29th, 1942. (590468.) " Ultra-high-frequency communication apparatus." 9885. February 25th, 1943. (590470.) " Multiplex signalling system." 11746. September 29th, 1942. (590472.) " Tuned circuit and system therefor." 11921. September 26th, 1942. (590473.) " Radio relay station." 16348. February 12th, 1942. (590506.) " Apparatus for generating frequency modulated oscillations." 16436. April 18th, 1941. (590476.) " Pulsed radio-transmission system." 16884. August 13th, 1942. (590477.)

Robertshaw Thermostat Co. — " Relays." 3189. February 19th, 1943. (590501.)

Western Electric Co., Inc.—" Electron discharge devices." 4772. August 29th, 1942. (590463.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Noise suppression circuits for radio receivers." 7039. April 17th, 1944. (Addition to 555403.) (590366.)

Telefonaktiebolaget L. M. Ericsson.—" Electrical oscillatory circuits particularly in contact converters." 7444. April 22nd, 1943. (590326.)

C. D. McCreddie (Telefonaktiebolaget L. M. Ericsson).—" Electrical inverter circuits." 7445. April 21st, 1944. (Convention date not granted.) (590327.)

Raytheon Manufacturing Co.—" Electron discharge devices." 8059. March 30th, 1942. (590465.)

Standard Telephones & Cables, Ltd.—" Radio detection system." 9034. November 28th, 1942. (590469.) " High-frequency electron discharge devices." 11124. December 15th, 1942. (590471.) " Electron discharge devices." 18316. January 30th, 1943. (590507.) " Electric impulse generators." 18522. August 12th, 1941. (590480.) " Thermionic valve delay circuits." 20198. March 20th, 1942. (590484.) " Electron discharge devices." 21023. November 23rd, 1942. (590486.) " Gunfire control systems." 22224. August 22nd, 1942. (590489.) " Glide path radio beacons." 22765. May 7th, 1942. (590491.) " Radio obstacle detection system." 23259. January 4th, 1943. (590494.) " Electric wave impulse generators." 23260. February 25th, 1942. (590495.)

Standard Telephones & Cables, Ltd., and C. N. Smyth.—" Thermionic cathodes." 12024. June 23rd, 1944. (590411.)

Standard Telephones & Cables, Ltd., E. M. S. McWhirter, H. M. M. D'Assis-Fonseca, and H. J. Ward.—" Electric signalling systems." 14300. July 26th, 1944. (590372.)

General Electric Co., Ltd., and W. G. Thompson. — " Electrical rectifier systems." 10456. May 31st, 1944. (590370.)

P. D. McGuffie.—" Means for and method of deriving energy from water power and more especially from tidal power." 11922. June 23rd, 1944. (590331.)

Western Electric Co., Inc.—" Apparatus utilizing a rotating energy beam for affording a visual plan indication of the position of remote objects." 13066. December 20th, 1941. (590504.)

Bendix Aviation Corporation.—" Means for reproducing motion electrically at a distance." 15288. June 21st, 1943. (590334.)

Western Electric Co., Inc.—" Wave transmission networks." 15775. May 15th, 1943. (590474.)

British Thomson-Houston Co., Ltd.—" Apparatus for regulating the supply of air from a compressor to an enclosure." 16122. September 30th, 1942. (590475.)

Wico Electric Co.—" Magnetos." 24624. October 12th, 1943. (590499.)

Siemens Bros. & Co., Ltd., and R. S. Bone.—" Telephone instruments." 26060. December 29th, 1944. (590378.)

P. R. Mallory & Co., Inc.—" Dry primary cells." 8394. December 9th, 1942. (590466.) " Primary cells." 8395. January 23rd, 1943. (590467.)

1945

Standard Telephones & Cables, Ltd.—" Electron discharge devices." 41. January 8th, 1944. (590519.) " Indirectly-heated cathode structures for electron-discharge devices." 2090. January 31st, 1944. (590520.) " Construction of radio apparatus." 9896. December 11th, 1943. (590539.) " Thermionic amplifier for coupling to balanced output

circuits." 9897. January 16th, 1943. (590443.)

Standard Telephones & Cables, Ltd., and E. O. Willoughby.—" Antennae for broad frequency band operation." 98. January 1st, 1945. (590413.)

B. Schwarz.—" Means for the protection of electric motors against overloading." 60. January 1st, 1945. (590379.)

Akt.-Ges. Brown, Boveri & Cie.—" Processes for operating steam generator plant." 517. November 11th, 1943. (590380.)

Western Electric Co., Inc.—" Wave guides." 1757. January 25th, 1944. (590351.)

Woods of Colchester, Ltd., B. B. Daly and E. N. Beavis.—" Fans." 1818. January 23rd, 1945. (590383.)

D. G. Jones and J. L. King.—" Combined centrifugal pump and motor units." 2697. February 2nd, 1945. (590385.)

British Thomson-Houston Co., Ltd.—" Apparatus and process for electroplating articles having recesses therein." 3076. February 9th, 1944. (590415.) " Gas turbine power plant." 5516. March 7th, 1944. (590418.) " Power plants." 5517. March 7th, 1944. (590419.) " Gas turbines." 5518. March 7th, 1944. (590420.) " Power plants." 5732. March 7th, 1944. (590422.)

E. G. Budd Manufacturing Co.—" Electric timing devices." 6326. January 4th, 1944. (590530.)

Soc. d'Electron-Chimie d'Electrometallurgie et des Acieries Electriques d'Ugine.—" Manufacture of magnets." 9074. April 7th, 1942. (590392.)

Electro-Hydraulics (Messier), Ltd., and R. Hadekel.—" Pumps or motors." 9294. April 13th, 1945. (590429.)

Svenska Turbinfabriks Aktiebolaget Ljungstrom.—" Manufacture of turbine rotors." 9456. May 6th, 1944. (590433.)

General Electric Co., Ltd., and S. S. Beggs.—" Lighting fittings." 9755. April 18th, 1945. (590357.)

J. D. McGee.—" Insulation of electrical conductors such as metal meshes suitable for use in television transmitting tubes." 9759. April 18th, 1945. (590394.)

Metropolitan-Vickers Electrical Co., Ltd., A. J. King, R. A. Scott and C. R. Maguire.—" Sound-absorbent structures." 15622. June 8th, 1943. (Cognate application 15623/45.) (Divided out of 9210/43.) (590540.) " Sound-absorbent structures." 15624. April 4th, 1944. (590541.)

Titeflex, Inc.—" Fastening means for flexible conduit." 7609. March 14th, 1944. (590533.)

1946

Robertshaw Thermostat Co.—" Relays." 2925. February 19th, 1943. (Divided out of 590501.) (590543.) " Relays." 2926. February 19th, 1943. (Divided out of 590501.) (590544.)

Municipal Reports

Stoke-on-Trent.—Figures showing the actual and true maximum loads last winter are given by the general manager (Mr. T. Lockett) in his report for 1946-47. The actual m.d. of 55,000 kW at 12.30 p.m. on December 23rd was the highest ever recorded, but had the frequency not been artificially restricted to 49·1 cycles the figure would have been 56,400 kW. At 11 a.m. on January 7th 53,800 kW was recorded with both frequency and voltage reduced; under normal conditions the load would have been 59,100 kW.

In spite of the restrictions total sales, excluding bulk supplies, rose by 27·3 million kWh to 198·1 million; lighting, cooking and heating being responsible for nearly 15 million kWh of this increase. In the past two years distribution improvements costing £583,962 have been authorized, but owing to delays in the supply of materials only £212,482 has actually been incurred.

Damage to mains due to mining subsidence presents a particular problem. A fault of this nature occurred on a 33-kV feeder when a barrier joint failed. Standard expansion arrangements cannot be embodied in this special type of joint, but additional expansion joints inserted in the main near to the barrier joint allow for considerable ground movement.

The year's gross income totalled £906,066, an increase of £111,127, and the net profit was practically the same at £25,041, as was the average revenue per kW sold (1·03d.). The engineer mentions that there are 20,000 penny coin meters and in the winter about £2 (weighing 10 lb) is collected from each, so that from six meters a collector takes half a hundredweight of coins.

Mansfield.—Satisfactory progress with the change-over from d.c. to a.c. is recorded by the engineer and manager (Mr. A. Latham) in his report for 1946-47. At the close of the year 4,195 consumers were being supplied from the d.c. and 12,680 from the a.c. system, 649 having been changed over during the year. The total quantity of electricity sold increased by over 25 per cent to 23·7 million kWh. Revenue rose by £26,922 to £143,630 and working expenses by £25,446 to £96,085. Loan charges and income tax were lower and the net result was a profit of £2,889 compared with a loss of £2,898 in 1945-46. A revised bulk supply agreement resulted in a saving of £2,817 during the year. The average price received per kWh sold was 1·379d. (against 1·46d.); to meet rising costs relatively small increases in charges were put into effect as from the last quarter of the year.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—October 6th. Western Australia Government Tender Board, Perth. Transformers (Sch. 225 A, 1947); 22-kV metalclad and 66-kV outdoor switchgear (Sch. 226 A, 1947); 22-kV metalclad switchgear (Sch. 227 A, 1947); and 3-kV switchgear (Sch. 228 A, 1947).

Barking.—August 25th. Electricity Department. One 10/15-cwt electric vehicle. (See this issue.)

Birkenhead.—September 15th. Electricity Department. One 80-kW mercury arc rectifier equipment. (August 1st.)

Cheadle and Gatley.—August 25th. Electricity Department. Two 500-kVA and one 600-kVA oil-cooled transformers. (See this issue.)

Dover.—August 15th. Corporation. Mercury discharge street lighting equipment. (August 1st.)

Farnworth. — August 16th. Electricity Department. Meters and 1,000-kVA transformer. (July 25th.)

Halifax.—September 1st. Electricity Department. Transformers. (August 1st.)

Iraq.—The Crown Agents for the Colonies invite tenders on behalf of the Iraq Government for twelve Diesel-driven generating sets. (August 1st.)

Lincolnshire.—August 15th. County Education Department. Electric lighting installation at Bourne County School. (August 1st.)

Manchester.—August 27th. Waterworks Committee. Fifteen sets of electrically driven pumps. (July 25th.)

Stoke Newington.—August 25th. Electricity Department. E.h.v. and l.v. cables. (See this issue.)

Stoke-on-Trent.—September 10th. Electricity Department. Four 15,000-kVA transformers. (See this issue.)

Orders Placed

Manchester. — Electricity Committee. Accepted. Transformers, annual contract. — Ferranti. Ventilating plant, Stuart Street station.—Matthews & Yates. Two 60,000-kW turbo-alternators, Carrington station.—Metropolitan-Vickers Electrical Co. Mercury arc rectifier equipments.—Hackbridge & Hewittic Electric Co. 660-V d.c. switchgear, trolley-bus supplies.—Bertram Thomas (Engineers). L.v. switchgear, distribution substations.—English Electric Co.

Northumberland. — Education Committee. Accepted. Electrical installations in canteen kitchen and cooking depot at East and West Whorlton schools (£105).—A. McLean Brown.

Stoke Newington.—Electricity Committee. Recommended. Electric cookers in dwellings at the Woodberry Down housing estate.—Belling & Co. (300 cookers); Simplex Electric Co. (300 cookers). E.h.v. and l.v. switchboards and transformers in connection with supply to Woodberry Down estate:—Four l.v. switchboards (£2,509).—English Electric Co. Four h.v. switchboards (£7,390).—A. Reyrolle & Co. Six 750-kVA transformers (£5,492).—Transformers & Welders.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ancoats.—Office and works, Chapel Street and Long Street, W. Dale & Sons; Wellerman Bros., Ltd., builders, Edward Street, Hyde.

Batley.—Steel houses (50), Healey Lane; borough engineer, Brunswick Street.

Bradford-on-Avon.—Research laboratories for Geo. Spencer Moulton & Co., Ltd., Kingston Mills; Pictor, Snailum & Huggins, architects, Abbey Chambers, Bath.

Brighouse.—Houses (50), Stoney Lane site, for T.C.; John Jagger & Sons, Ltd., builders, Bradford Road.

Chipping Norton.—Houses (50), in four parishes (£102,185), for R.D.C.; Hooper & Jones, builders, Magdalen Road, Oxford.

Chorlton-cum-Hardy.—Co-operative departmental stores, Barlow Moor Road; Works Department, Manchester & Salford Equitable Co-operative Society, Ltd., Downing Street, Manchester, 1.

Cleator Moor.—Factory for Brannan & Sons; J. Laing & Sons, builders, Carlisle.

Cumberland.—Two new schools, Wigton (£148,000) and Brampton (£134,000); county architect, Alfred Street North, Carlisle.

Dagenham.—Extensions to works for Ford Motor Co., Ltd.,; T. A. McInery, staff architect.

Dudley.—Civic restaurant, Fisher Street (£15,000); borough surveyor.

Exeter.—Permanent houses (60), Countess Wear and Pinhoe estates; Harold B. Rowe, city architect, 2, Southernhay West.

Filey.—Houses (80), Primrose Valley site; H. Webster, architect, 5, Churchwood Avenue, Headingley, Leeds.

Harwich.—Houses (67), Blacksmith's Lane, Upper Dovercourt; P. H. Hawkins, builder, The Poplars, Main Road, Dovercourt.

Hendon.—Factory extensions, Edgware Road (£37,000), for Duple Motor Bodies, Ltd.; G. P. Trentham, Ltd., builders, Long Lane, Hillingdon.

Hereford.—Factory, offices, etc., at Ledbury, for Alex. Robb & Co., Ltd., biscuit manufacturers, Homend, Ledbury; Webb & Gray, 200, High Street, Dudley.

Hull.—Permanent brick houses (136), Bellfield Avenue East site; A. Rankine, city architect.

Kells (Cumberland).—Factory for Marchon Products, Ltd.; Sir Alexander Gibb & Partners, engineers, Queen Anne's Gate, London, S.W.1.

Kidderminster.—Rebuilding factory for Carpet Trades, Ltd.; Gilbert Wallis & Partners, architects, 5, Cromwell Road, S.W.7.

Kidsgrove.—New factory at Talke crossroads for G. H. Heath & Co., Ltd., Pickford Street Mills.

Lincoln.—Houses (58), Boultham Moor; city engineer, Corporation Offices, Silver Street.

Manchester.—Rebuilding Exchange for Manchester Royal Exchange, Ltd.; Bradshaw, Gass & Hope, architects, 19, Silverwell Street, Bolton.

Garage and repair works, Duke Place and Duke Street, for E. & F. Beattie, Ltd.; A. R. Walsingham, architect, 50, High Grove Road, Cheadle, Ches.

Middlesbrough.—Offices, Cargo Fleet Road (£66,846), for Cleveland Products, Ltd.; F. Shepherd & Son, Ltd., builders, Blue Bridge Lane, York.

Factory for Foister, Clay & Ward, Ltd., clothiers, Frog Island Works, Leicester; North-Eastern Trading Estates, Ltd.

Millom (Cumberland).—Factory for Derma, Ltd.; Sir Alexander Gibb & Partners, engineers, Queen Anne's Gate, London, S.W.1.

Morecambe and Heysham.—Houses (92), Trum Acre Lane; borough engineer, Marine Road East.

Newburn-on-Tyne.—Alterations and additions to two factories for the North Eastern Trading Estates; Grey & Kinghorn, Camden Street, North Shields.

Newton Rigg (Cumberland).—Reconstruction of Cumberland and Westmorland Farm School (£25,684), for Joint Agricultural Committee; J. Laing & Son, builders, Carlisle.

Nottingham.—Extensions to factory, General Embroidery Co., Ltd., Hollis Street; Andrew Purves, 12, Exchange Street, Manchester.

Penrith.—New factory for S. Redmayne & Sons, Ltd., Wigton.

Plymouth.—Factory for Thomas & Evans, Ltd., Porth, Glam.; Sir Patrick Abercrombie & Richard Nickson, 33, Welbeck Street, W.1.

Pwllheli.—Bacon factory at Parciau; Thos. Roberts & Son, Port Dinorwic, Caernarvon.

Potters Bar.—Factory and offices, Cranborne Road, for J. & L. Randall, Ltd., Merit House, Southgate Road; Sir Robert McAlpine & Son, Ltd., 80, Park Lane, W.1.

Reading.—Technical college, Victoria Square (£1,000,000); Lanchester & Lodge, architects, 10, Woburn Square, London, W.C.1.

Rochdale.—Flats (72) in six blocks for Housing Committee; Unit Construction Co., Ltd., builders, Knutsford.

Rotherham.—Factory on Eastwood Trading Estate; Geo. Wigley & Sons (Nottingham), Ltd., 25, Warser Gate, Nottingham.

Salterbeck (Cumberland).—Factory for Luxan, Ltd.; John Laing & Sons, builders, Carlisle.

Factory for Cumbrian Tools, Ltd.; Thomas Armstrong, Ltd., builders, Cockermouth.

Sandwich.—Permanent houses (59), for T.C. (£88,560); Grummant Bros., builders, Ramsgate.

Scarborough.—"Airey" houses (68) for the T.C.; H. V. Overfield, borough engineer.

Extensions furniture factory, Wooler Street, W. Rowntree & Sons, Ltd.; A. W. Sinclair & Sons, Ltd., builders, Commercial Street.

Factory and offices, Seamer Road and Mill Lane, Scarborough Hosiery Co.; Anderson & Allen, 32, St. Nicholas Street.

Sheffield.—Factory in Petre Street for H. H. B. Sugg, Ltd., 127, Pinston Street.

Skipton.—Houses (80), Park Avenue, Sutton; R.D.C. surveyor, Granville Street.

Southport.—Additions and alterations to Transport Depot, Canning Road; Norman Jones, Son & Rigby, architects, Williams Deacon's Bank Chambers, Lord Street.

Stone (Staffs).—Houses (100), Barlaston and Wedgwood; R.D.C. surveyor, Old Hall.

Stretford.—School, Glastonbury Road, for R.C. authorities; Moston Brick & Building Co., Ltd., Kenyon Lane, Moston.

Stroud.—Aluminium bungalows (50), Cashes Green and Ebley; U.D.C. surveyor, Council Chambers, High Street.

Studley (Warwickshire).—Factory premises, Needle Industries, Ltd., Redditch; S. N. Cooke & Partners, Sun Buildings, Bennett's Hill, Birmingham.

Urmston.—Factory premises, Bailey Road, Trafford Park; Beck & Pollitzer, Ltd., 28, John Dalton Street, Manchester.

Wakefield.—Factory in Thornes Moor Road for Spear & Edwards, Ltd., Wakefield Glass Works.

Power for Aluminium Works

TO provide power for an aluminium plant to be established by the Aluminium Production Commission, the Tasmanian Hydro-Electric Commission is to build a 35,000-h.p. generating station at Trevallyn, on the South Esk river, near Launceston. The station, which will take five years to complete, will be interconnected with the State network.